9th Generation Plasma Display

Technical Information

The technicians have express their needs and we listened.

This presentation has been developed especially for the technicians involved in the repair of our plasma televisions.

We’ve gathered and analyzed your emails, questions, feedback, and requests. Based on this information, we have put together a presentation to fulfill your needs.

Topics

- Power Supply/System Control Interaction
- Boards Isolation
- Understanding SOS Condition
- Video Processing
- Troubleshooting

9th Generation Plasma Display Television

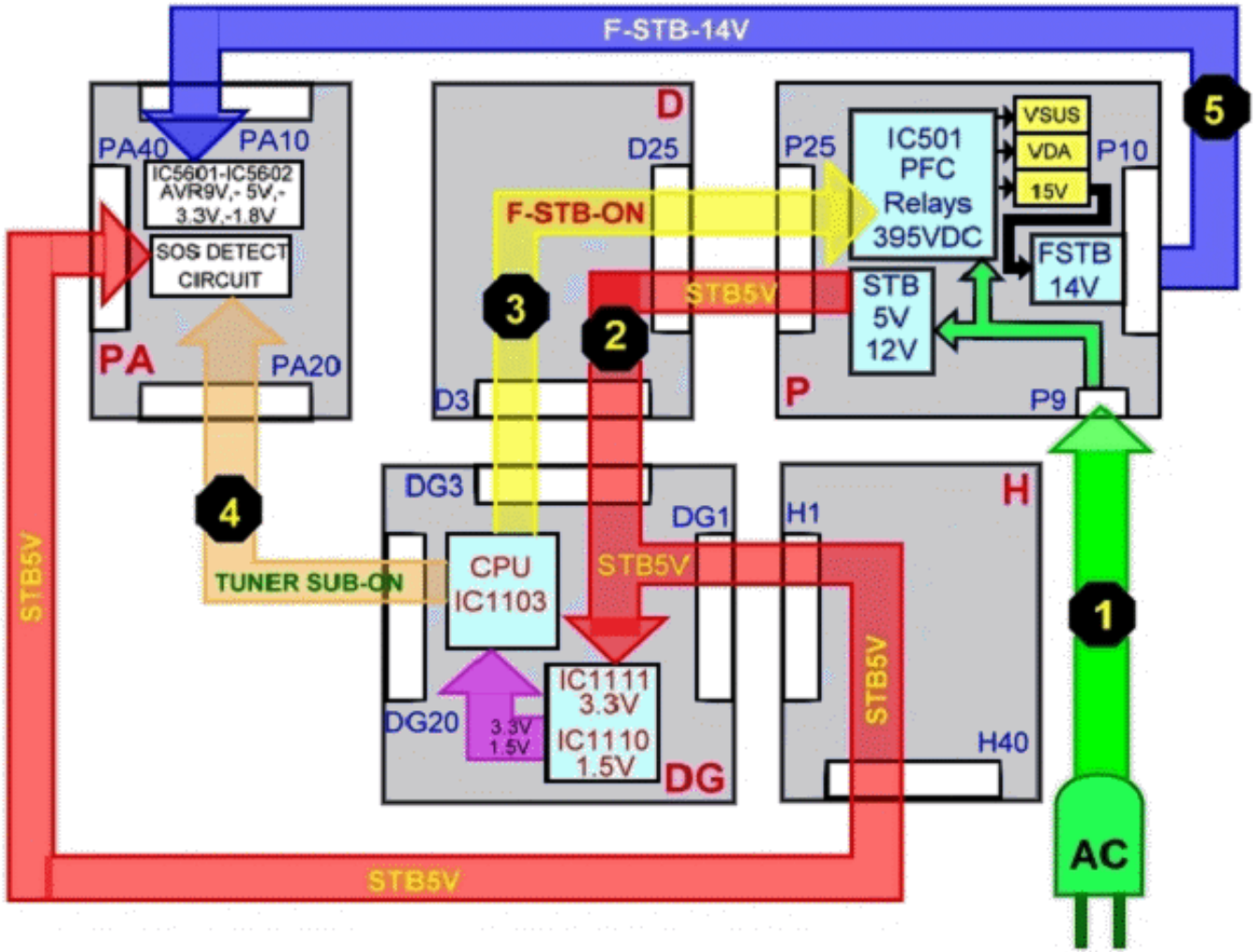
- What really happens when the TV is plugged in?

Sequence of Events when the TV is Plugged In

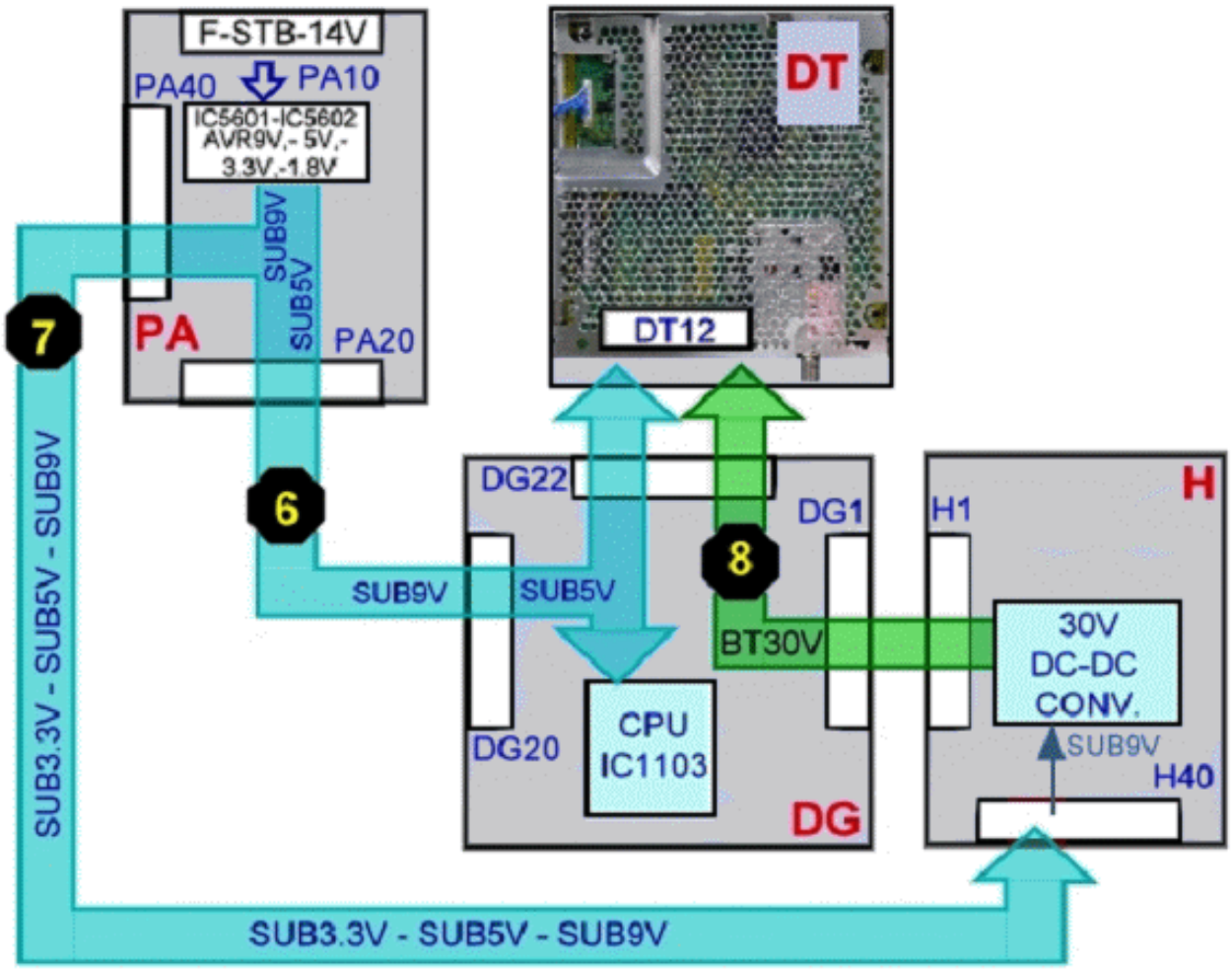
When the Plasma TV is plugged in, there're a few indications of normal operation. Knowing this will help us understand what's going on with the unit when an abnormality occurs.

1. There is a click from the relays **RL402** and **RL403** when they are activated.
2. The LED in the Optical Jack inside the DT board turns on for approx. 4 seconds.
3. Immediately after that, one of the Tuner LEDs (Right) turns on **(Solid Red)** for approximately 20 seconds.
4. The LED in the Optical Jack inside the DT board turns on again for approx. 1 second and both LEDs (tuner and optical jack) turn off.
5. Then you will hear another click from the relays **RL402** and **RL403** indicating that they are no-longer engaged. (Note: At this time the Tuner and the Optical Jack LED turn off.)

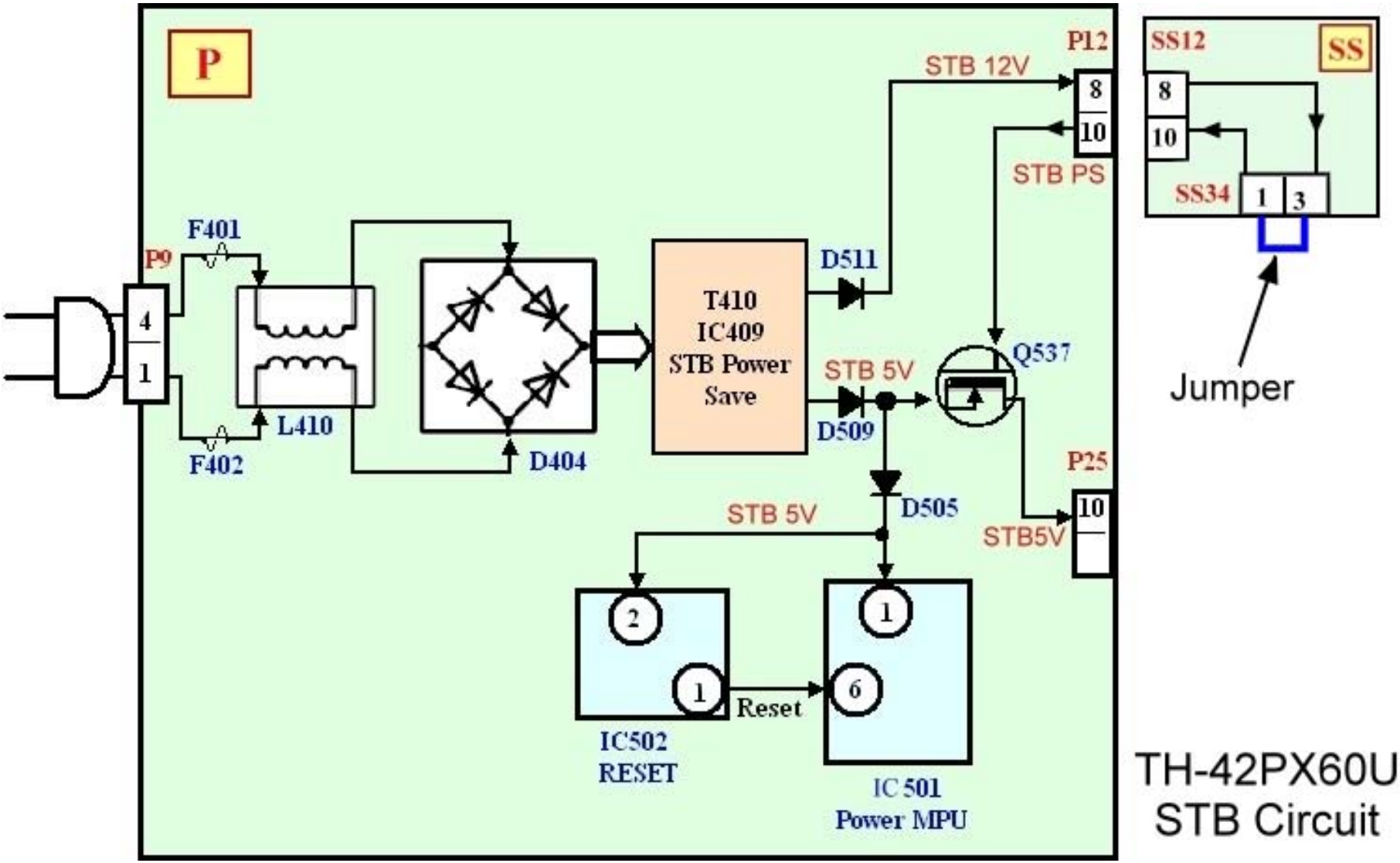
Standby Block (Part 1)



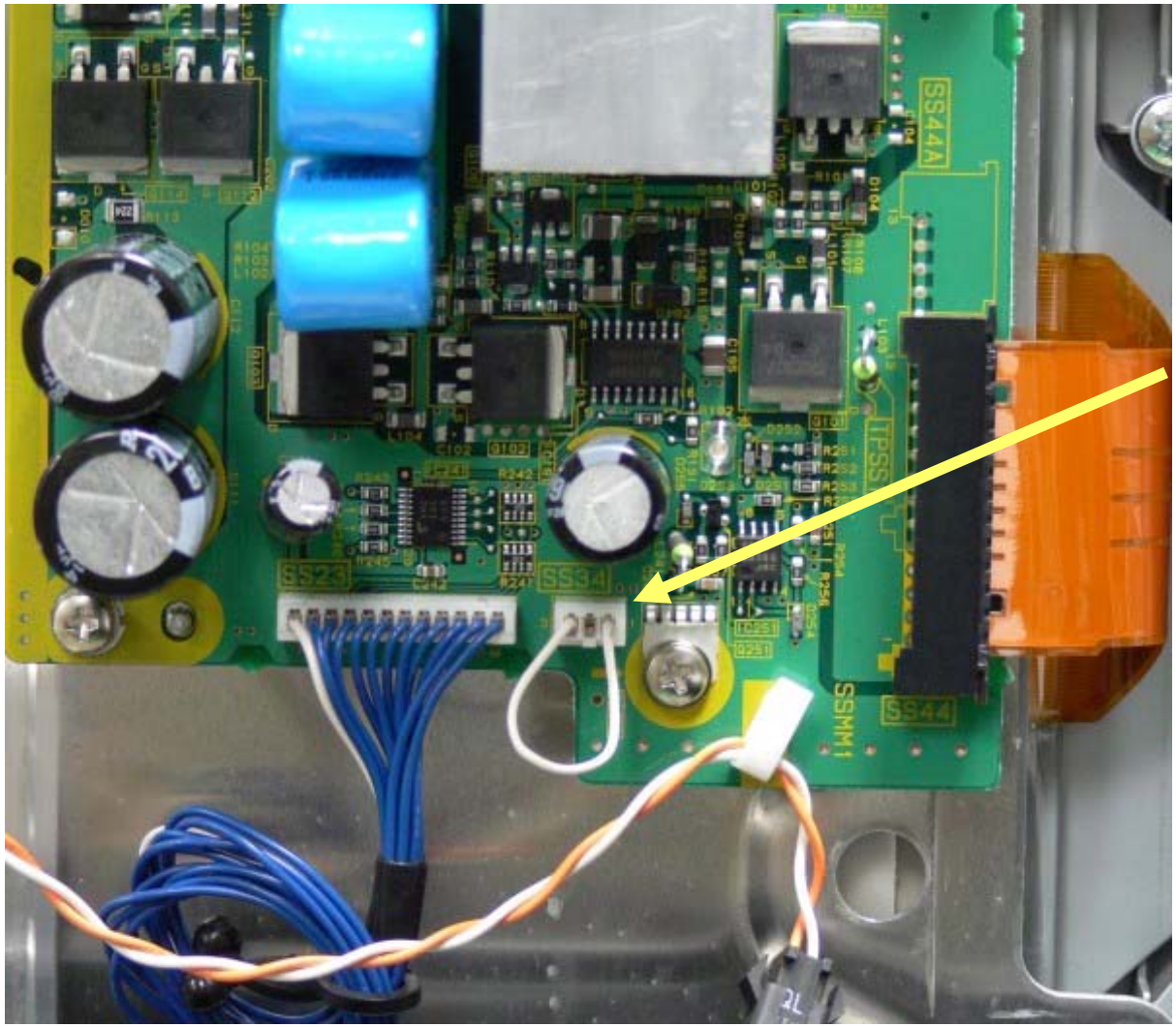
Standby Block (Part 2)



Power Supply (Standby Circuit)

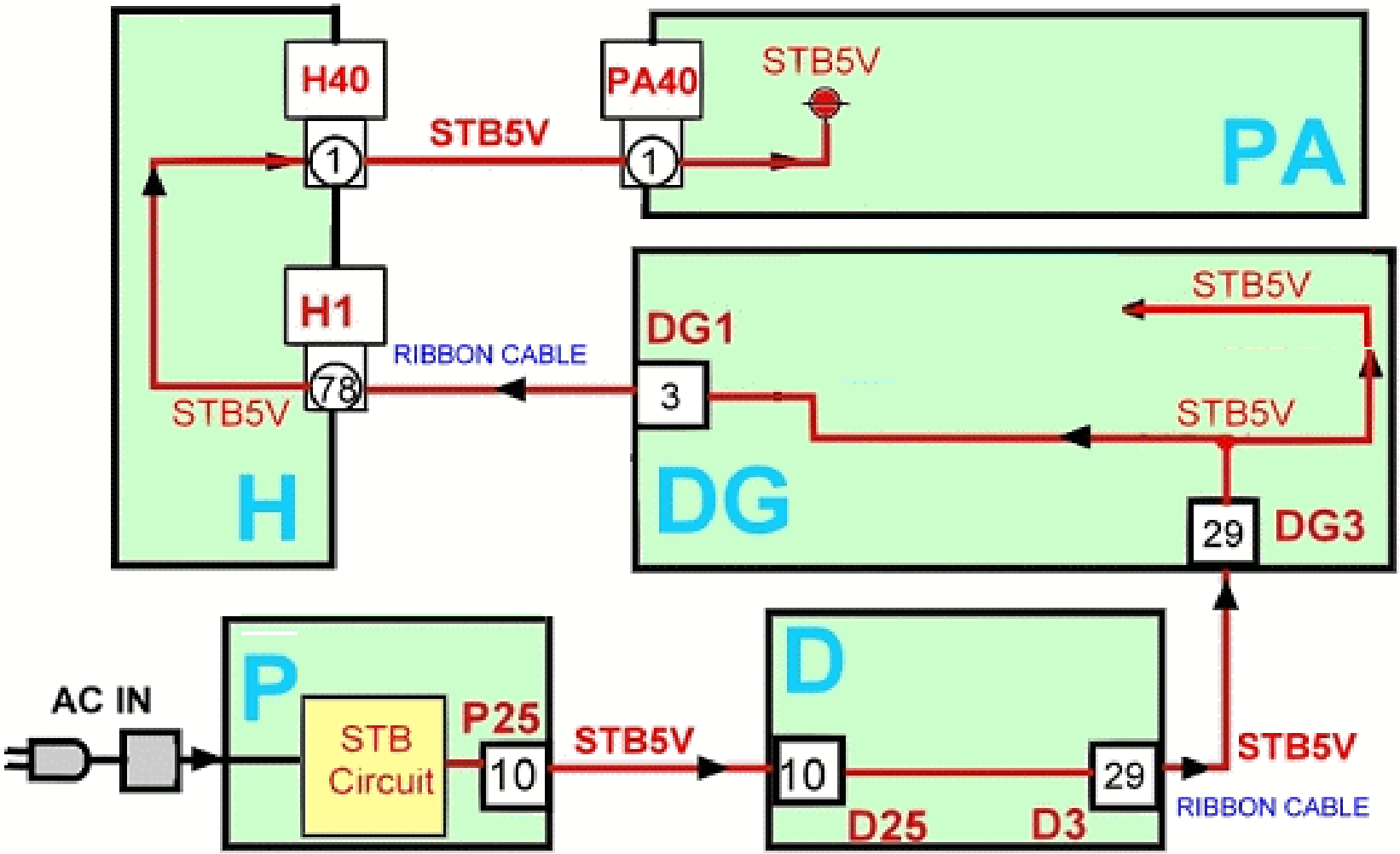


Power Supply (Standby Circuit)

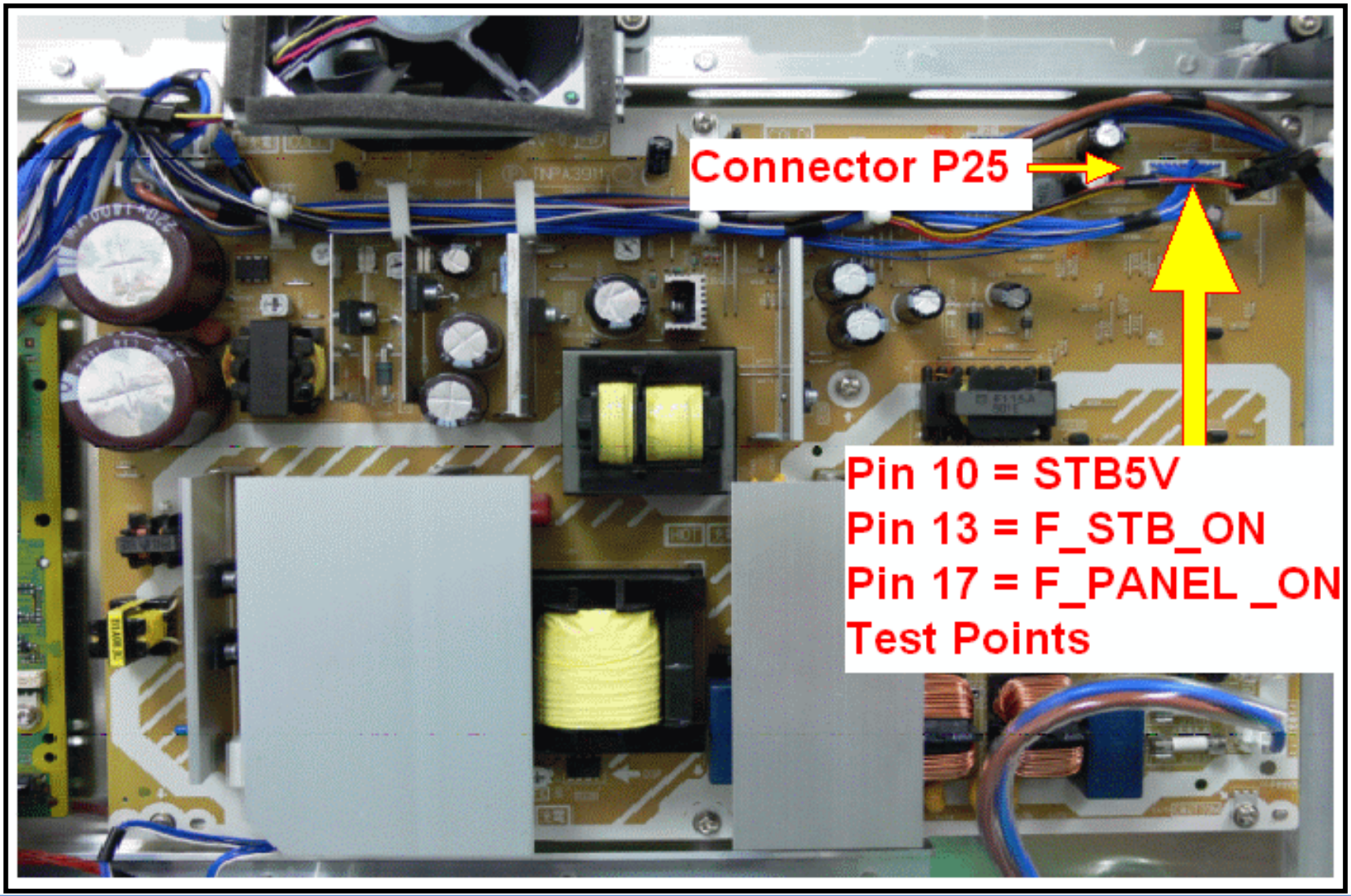


SS34 Connector

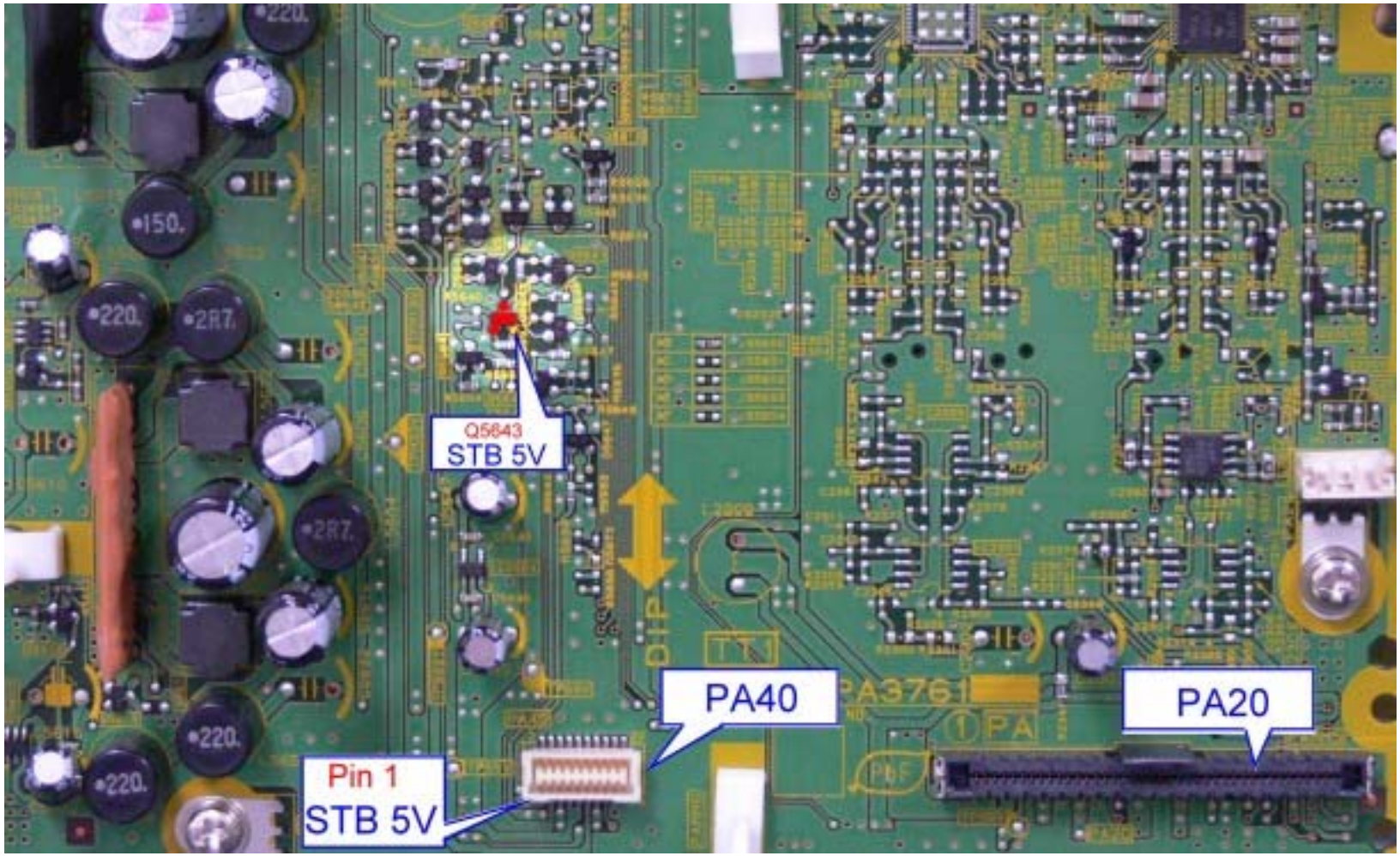
STB5V Distribution



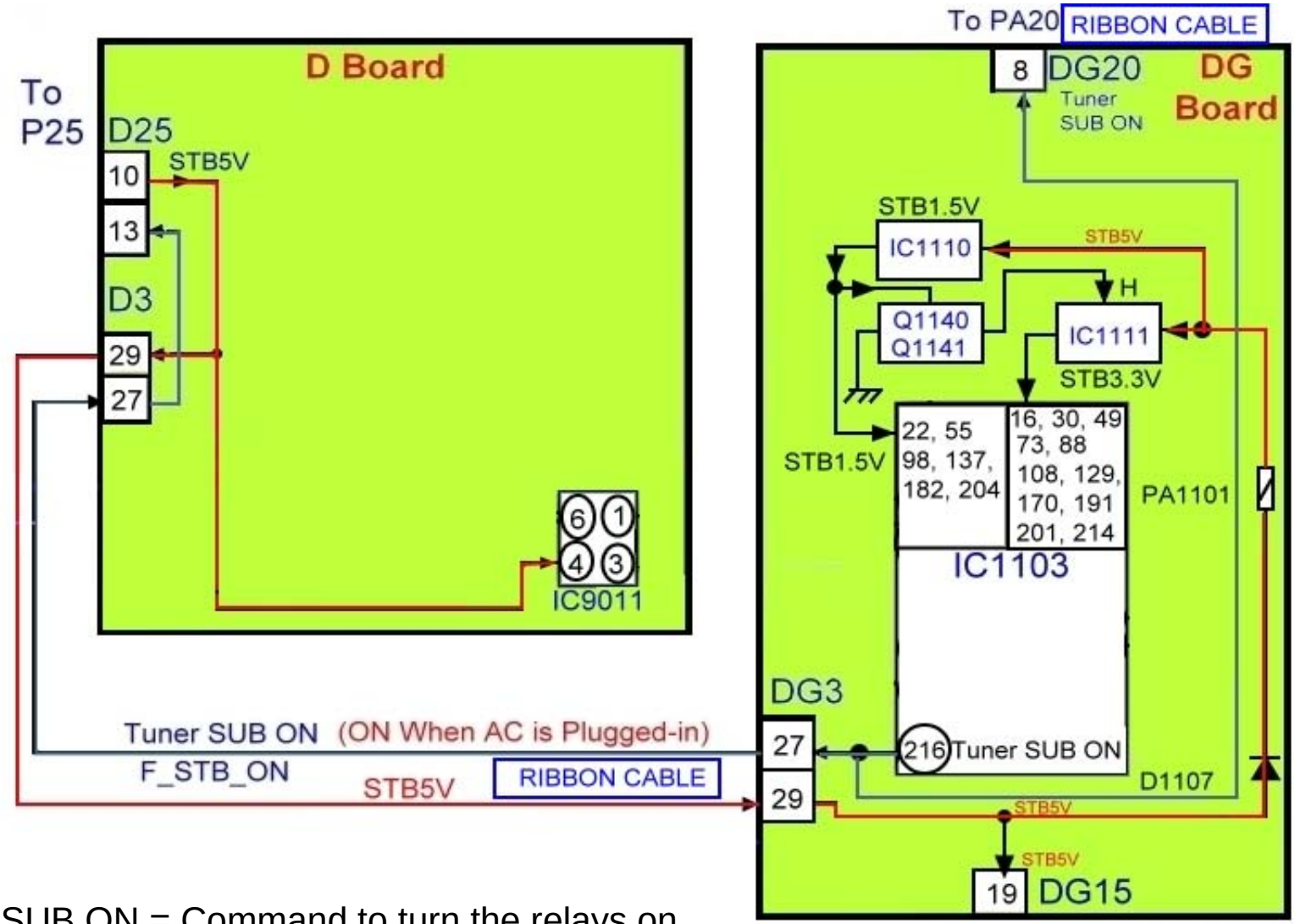
STB5V Test Point (P board)



STB5V Test Point (PA board)

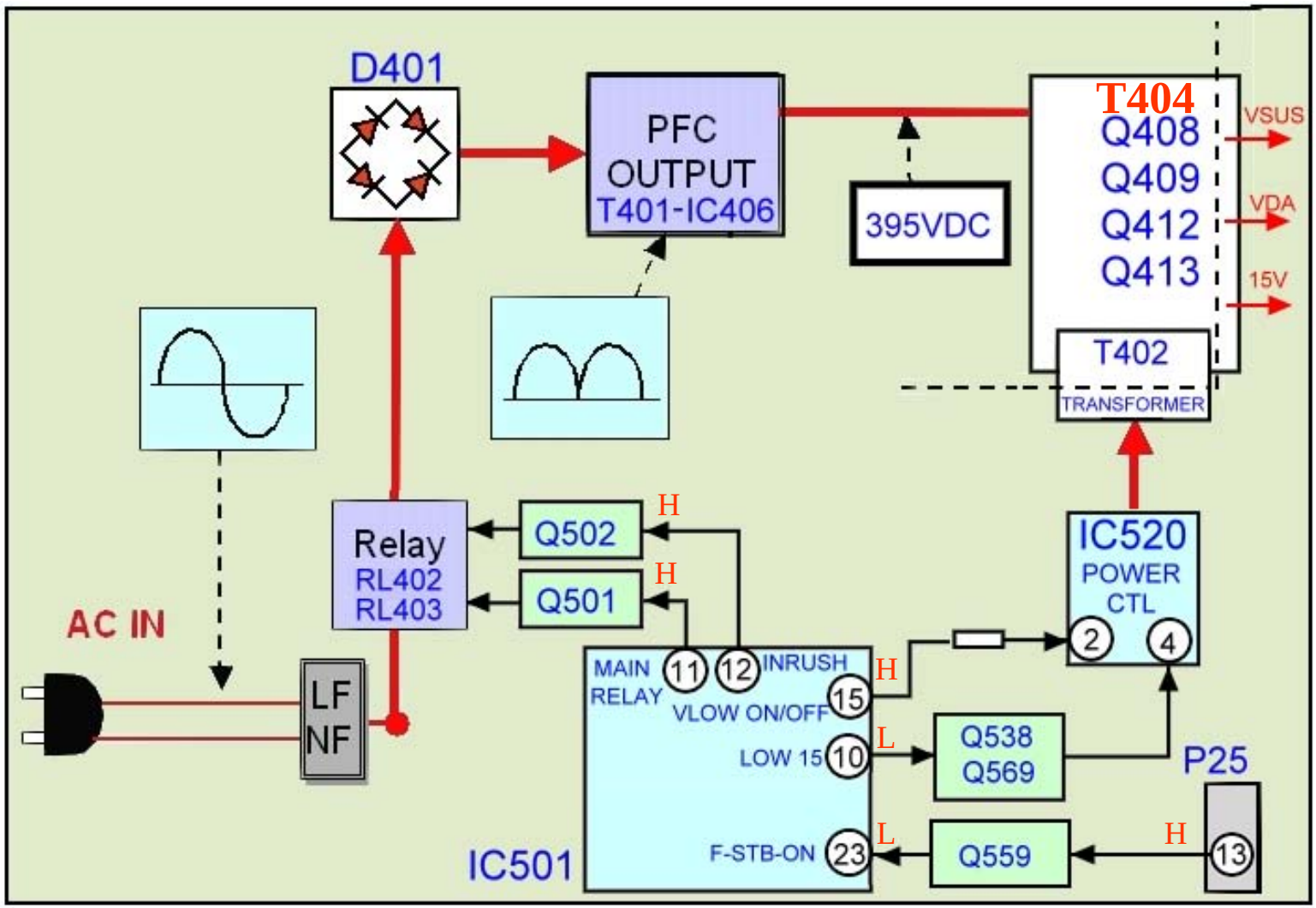


Power Supply (Standby Circuit)

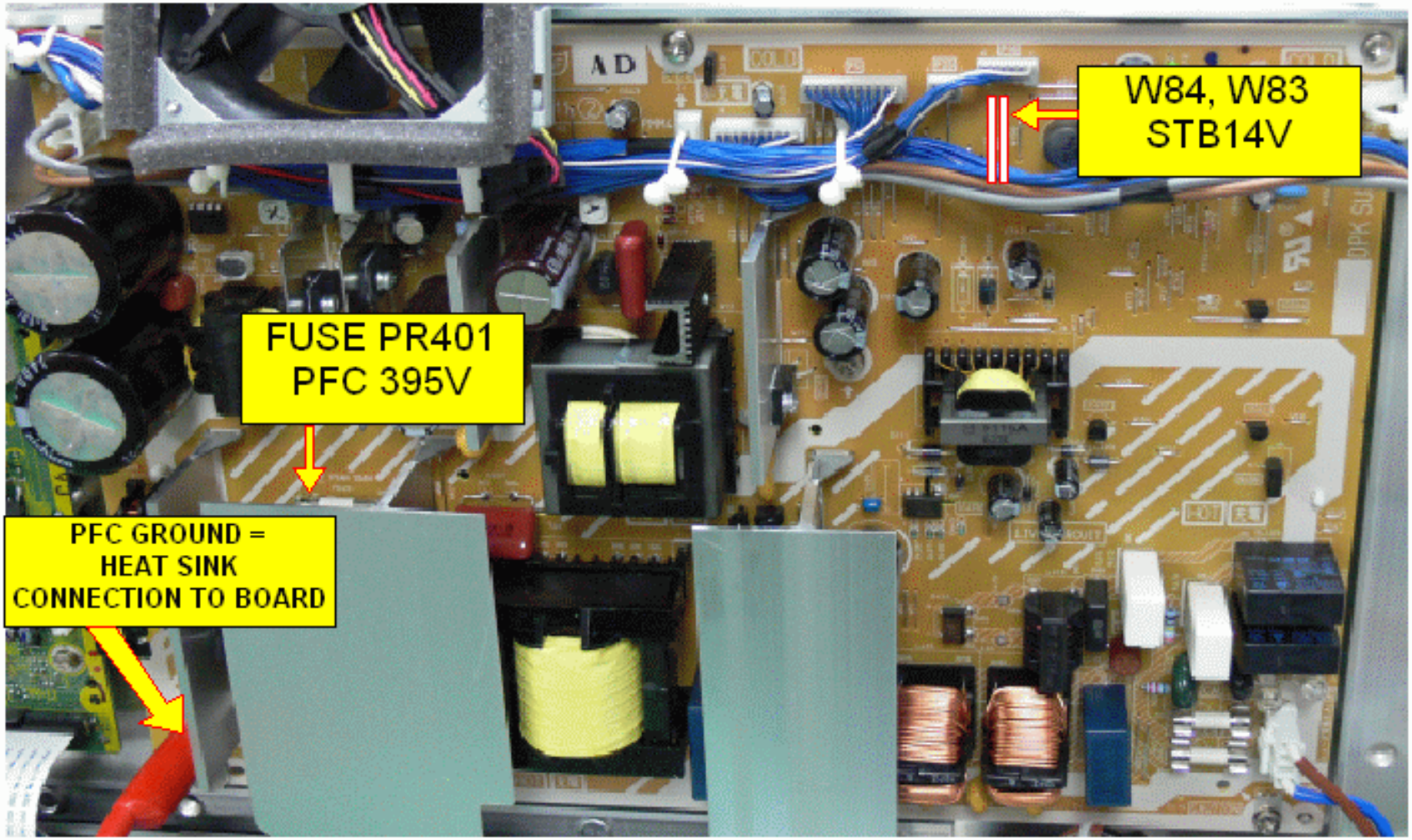


Tuner SUB ON = Command to turn the relays on.

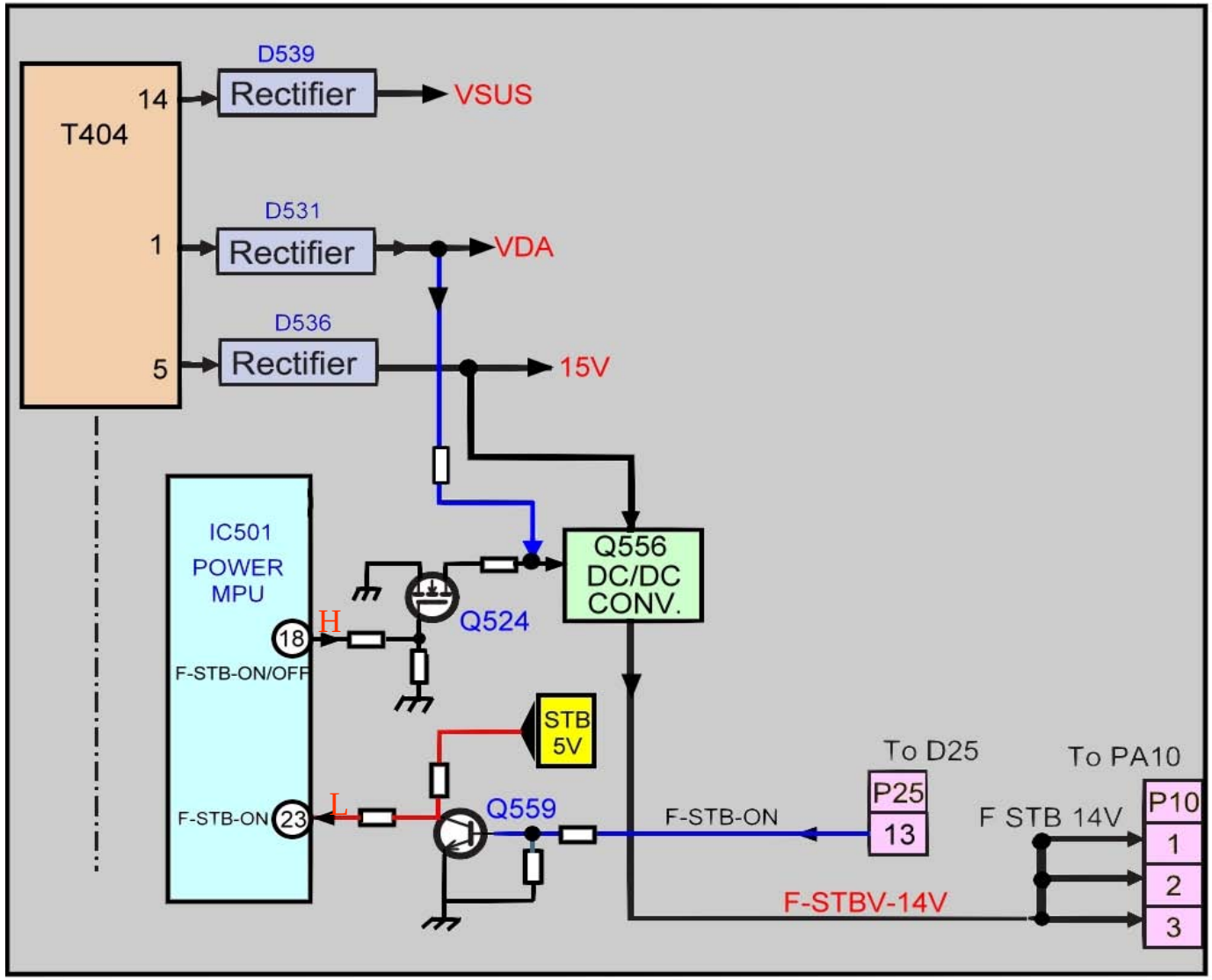
F-STB-ON (Primary)



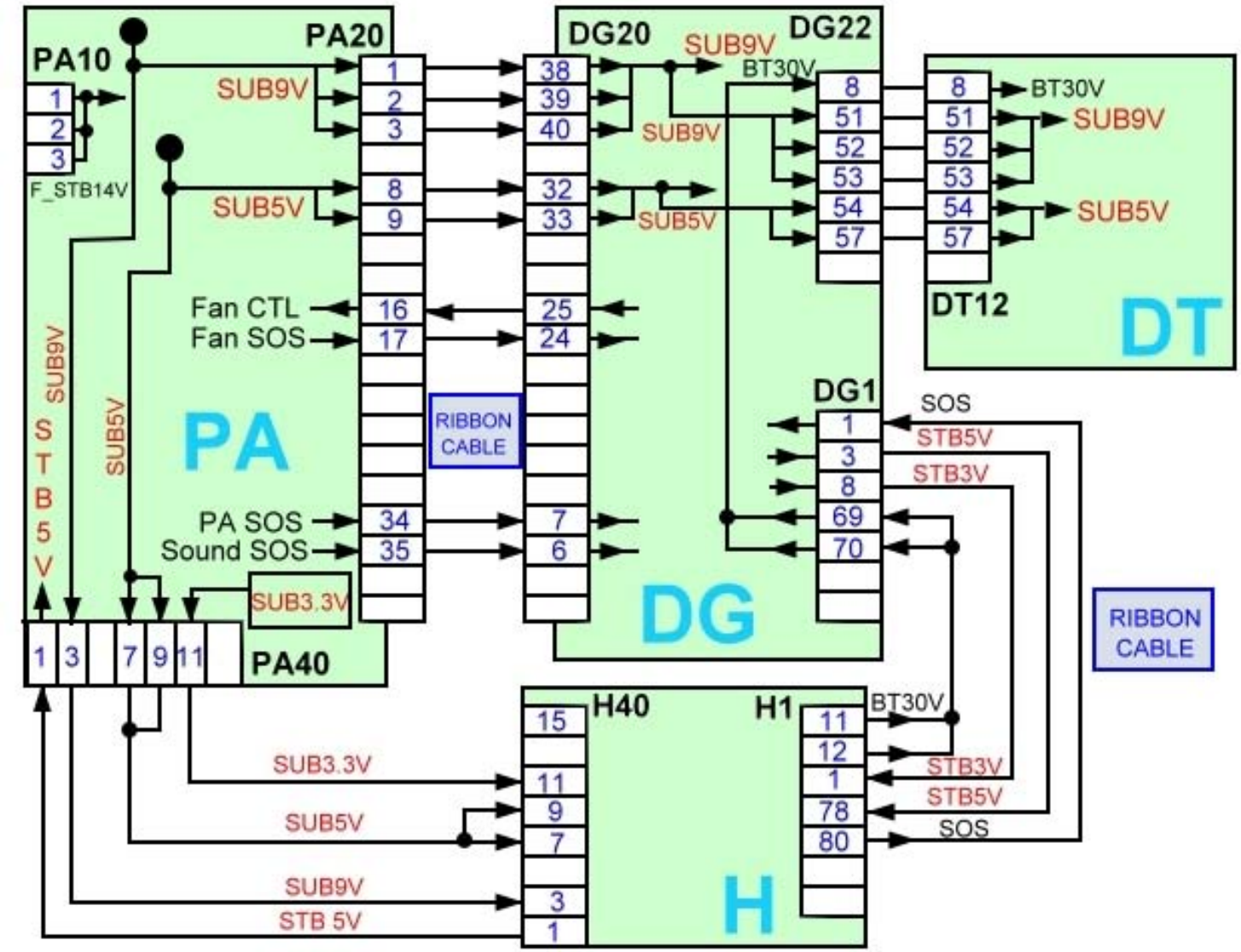
F-STB-14V and PFC Test Points



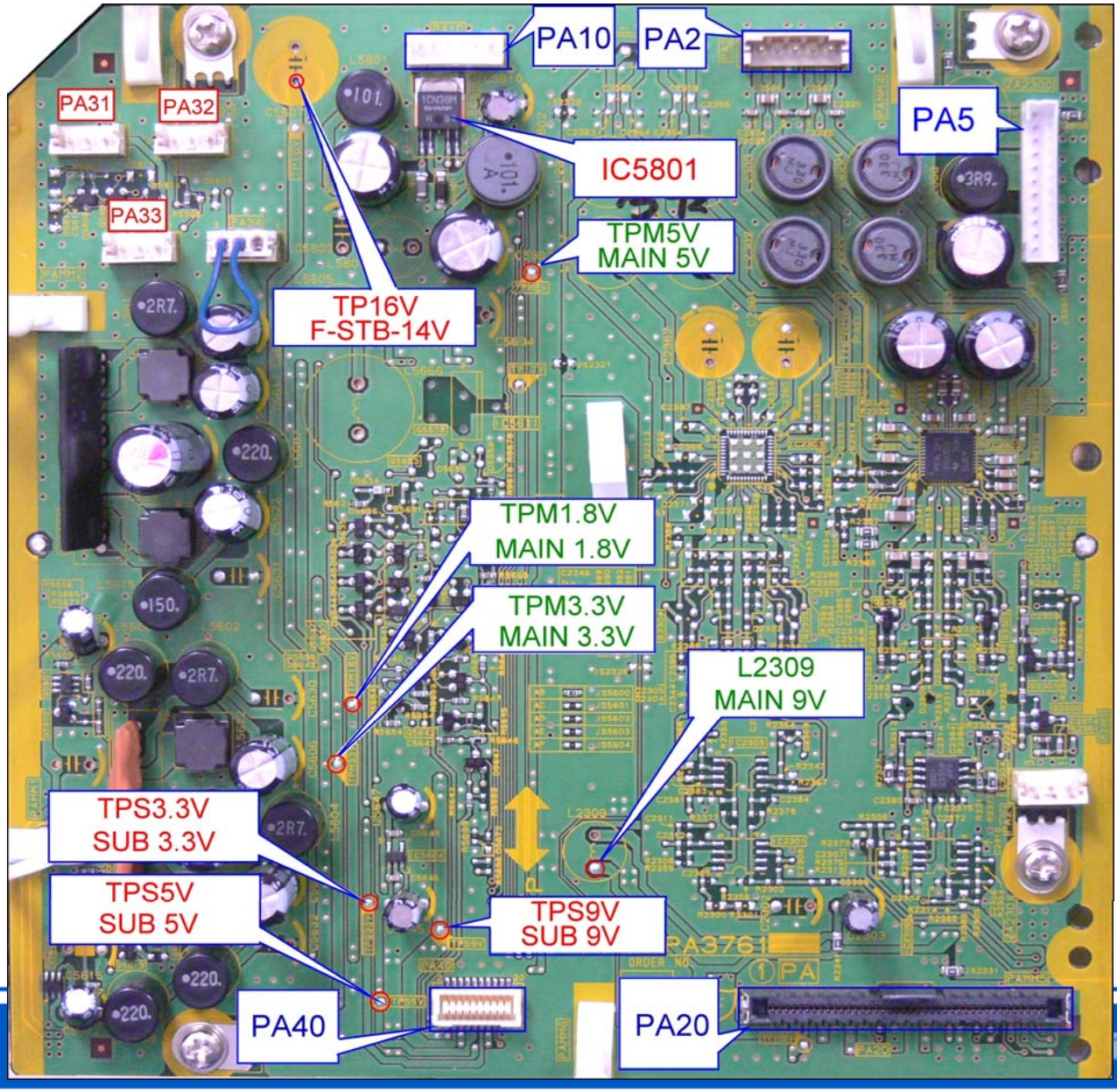
F-STB-14V



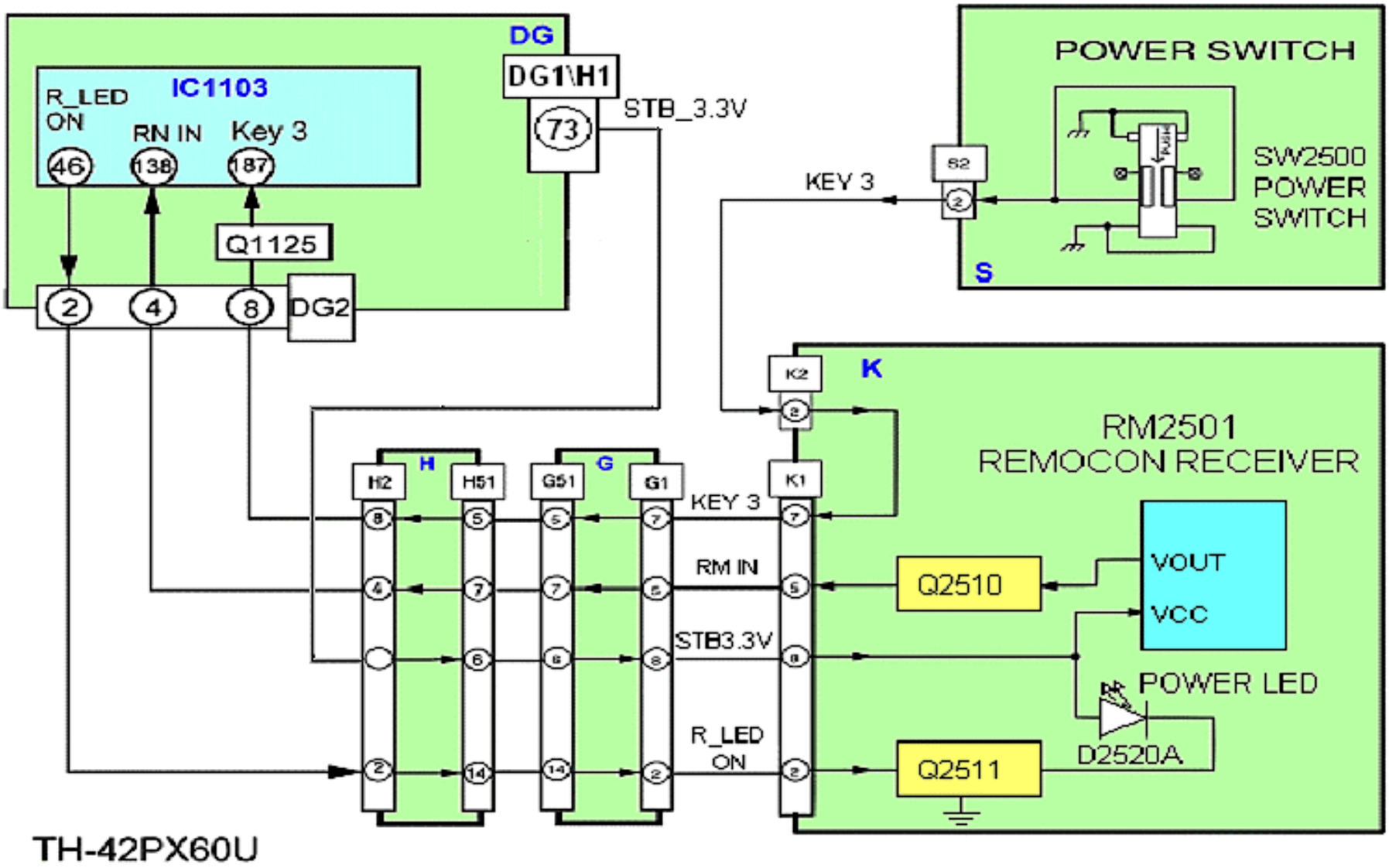
SUB-Voltages Output From the PA Board



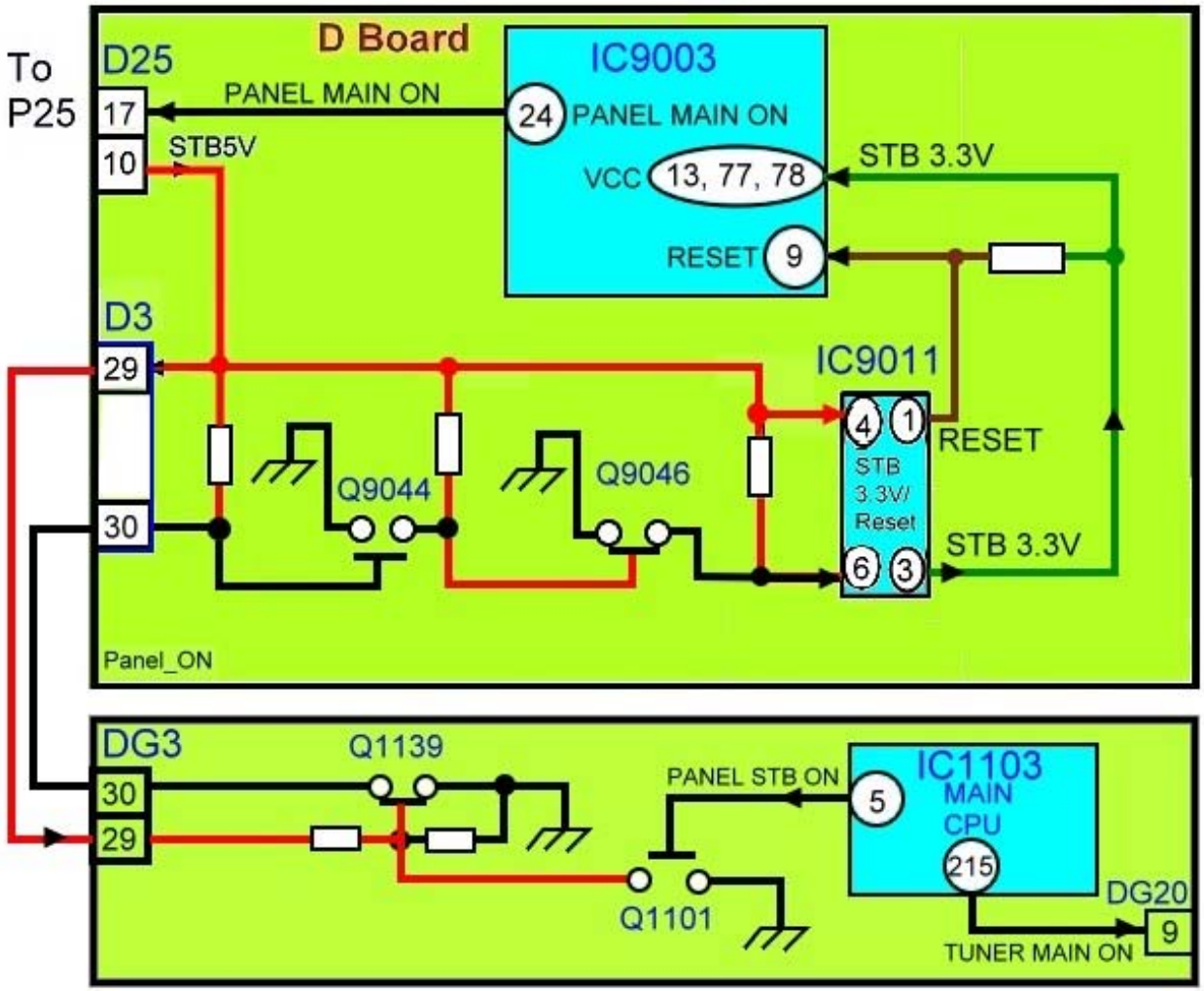
PA Board Test Points



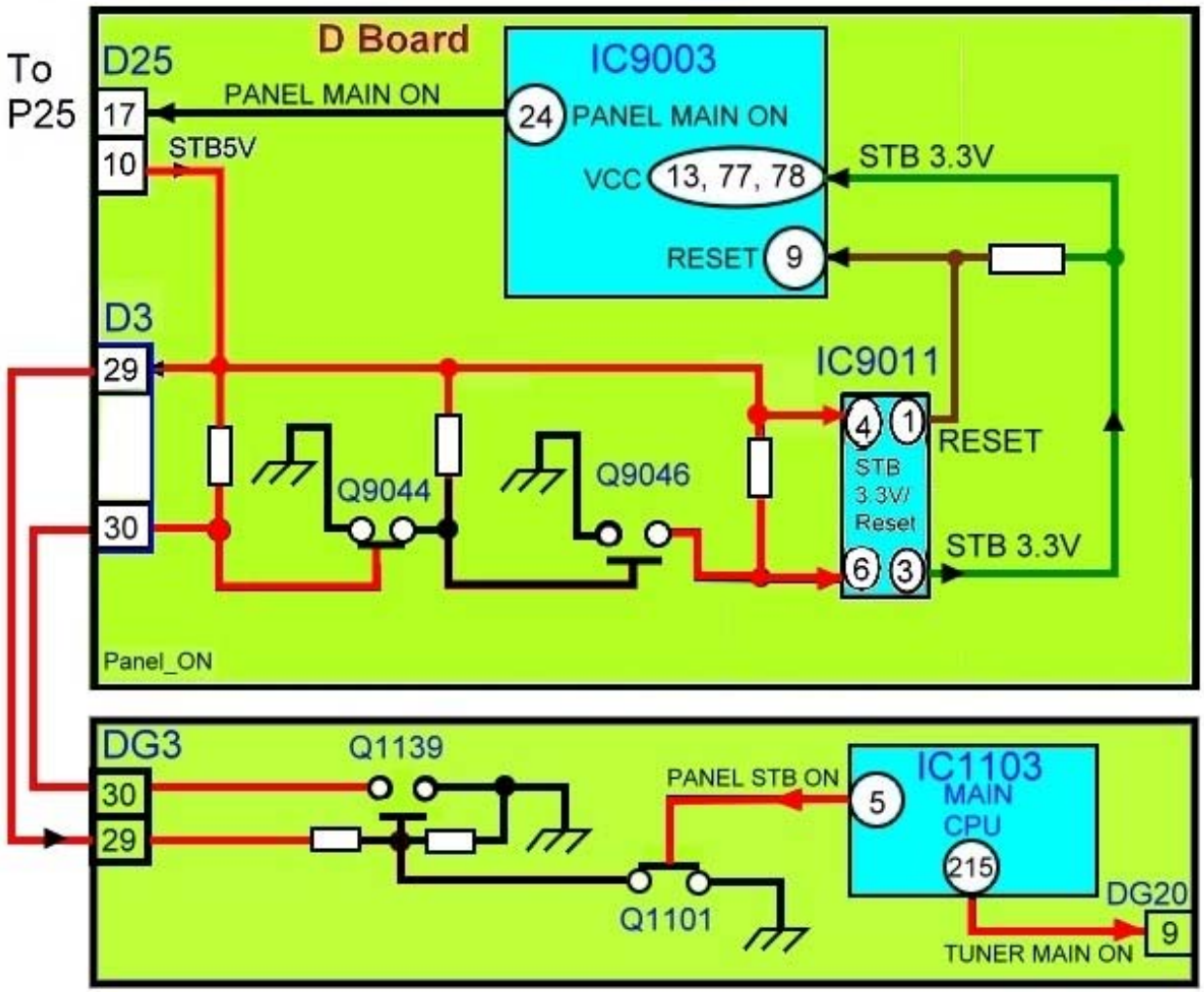
Power On/Off Operation



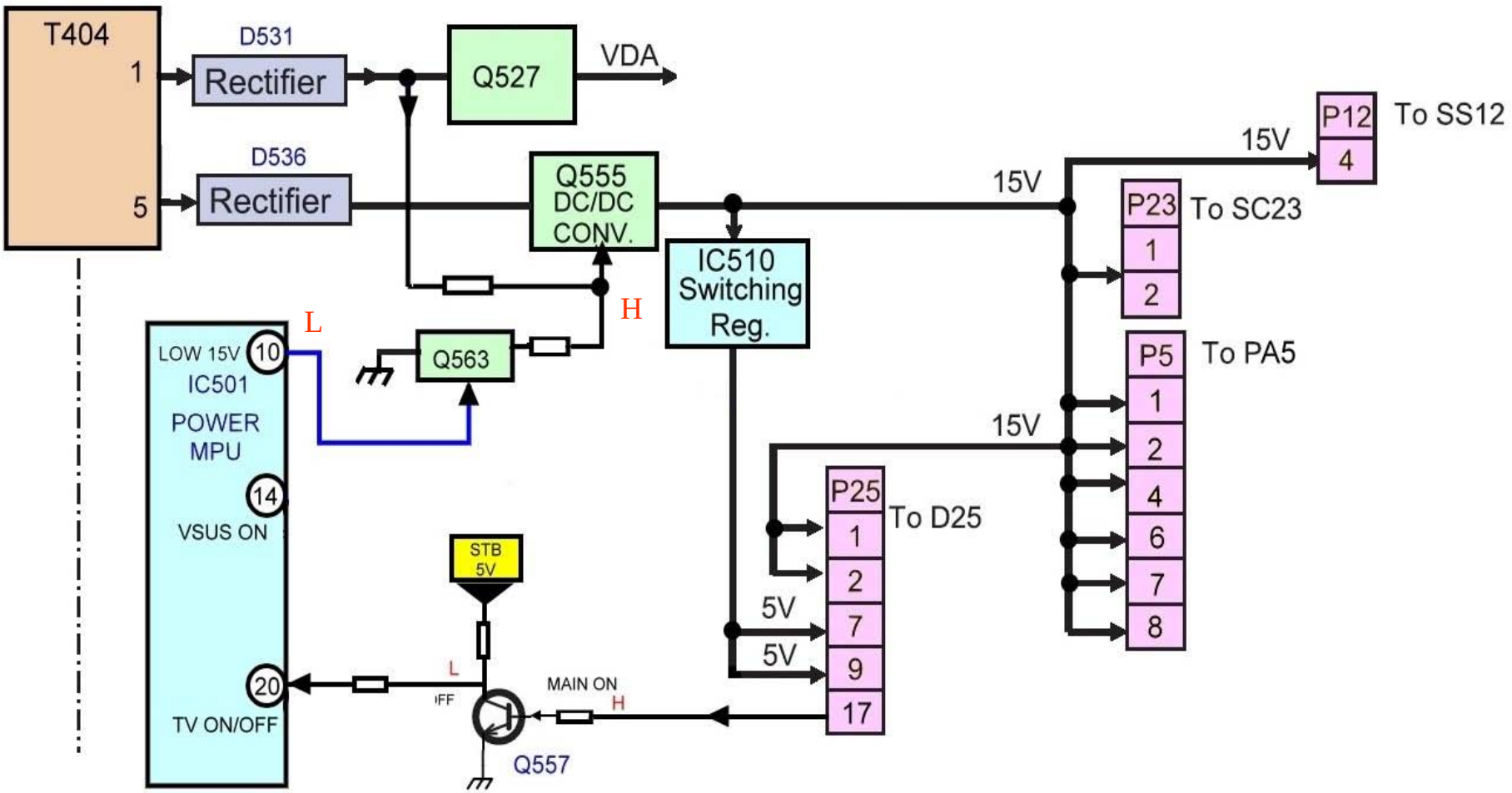
Power Off



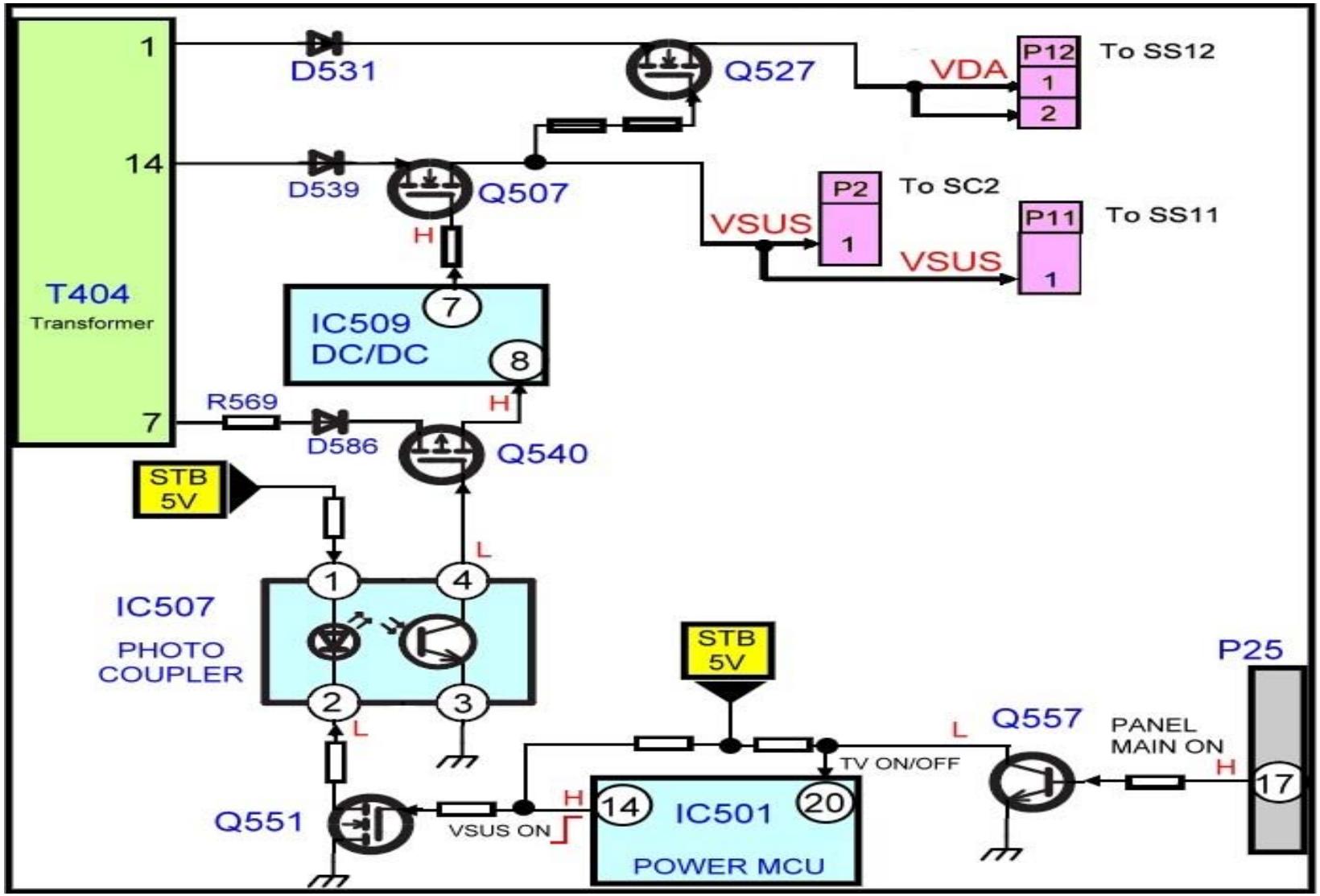
Power On



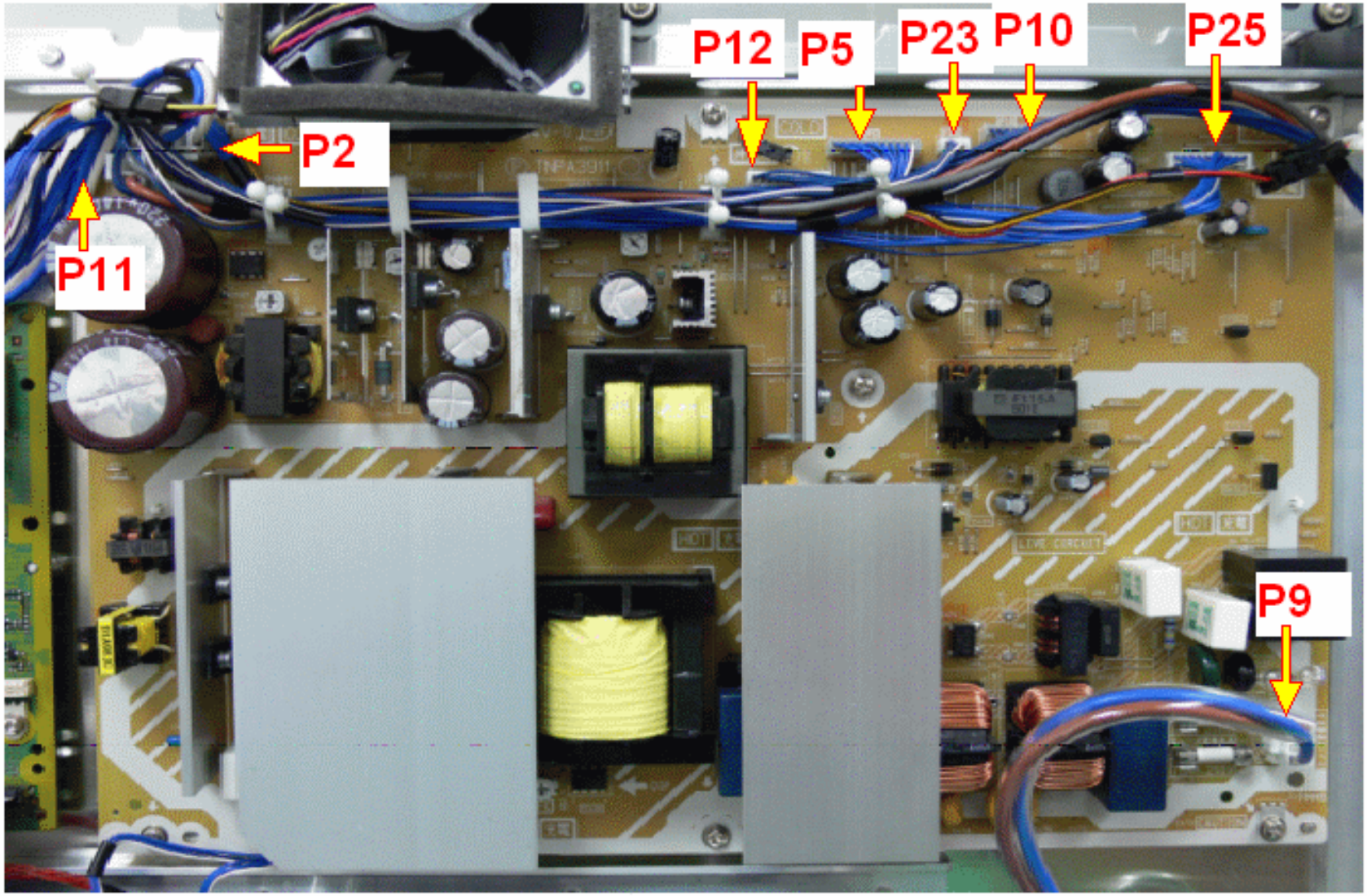
Power Supply Secondary Circuit (1)



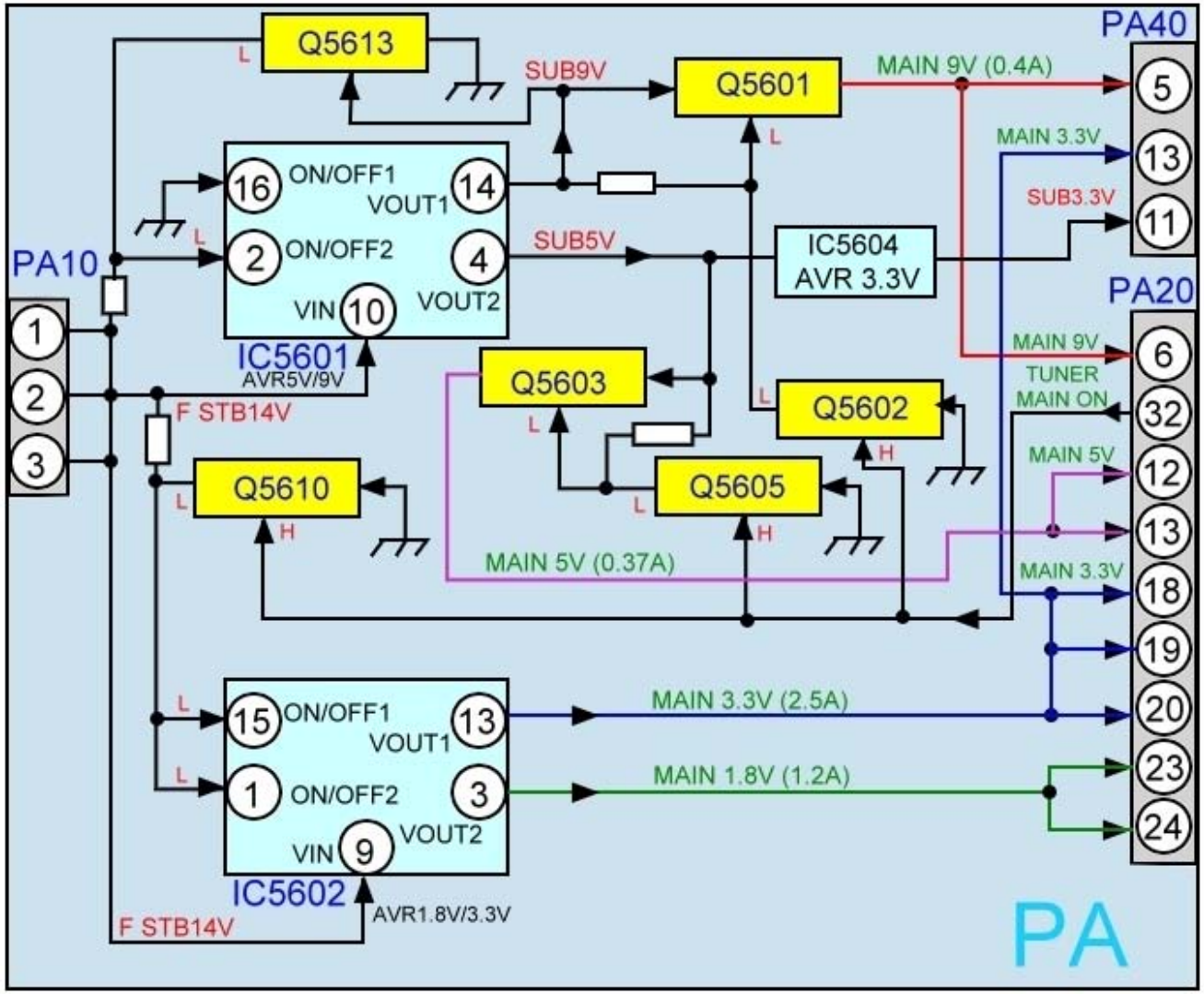
Power Supply Secondary Circuit (2)



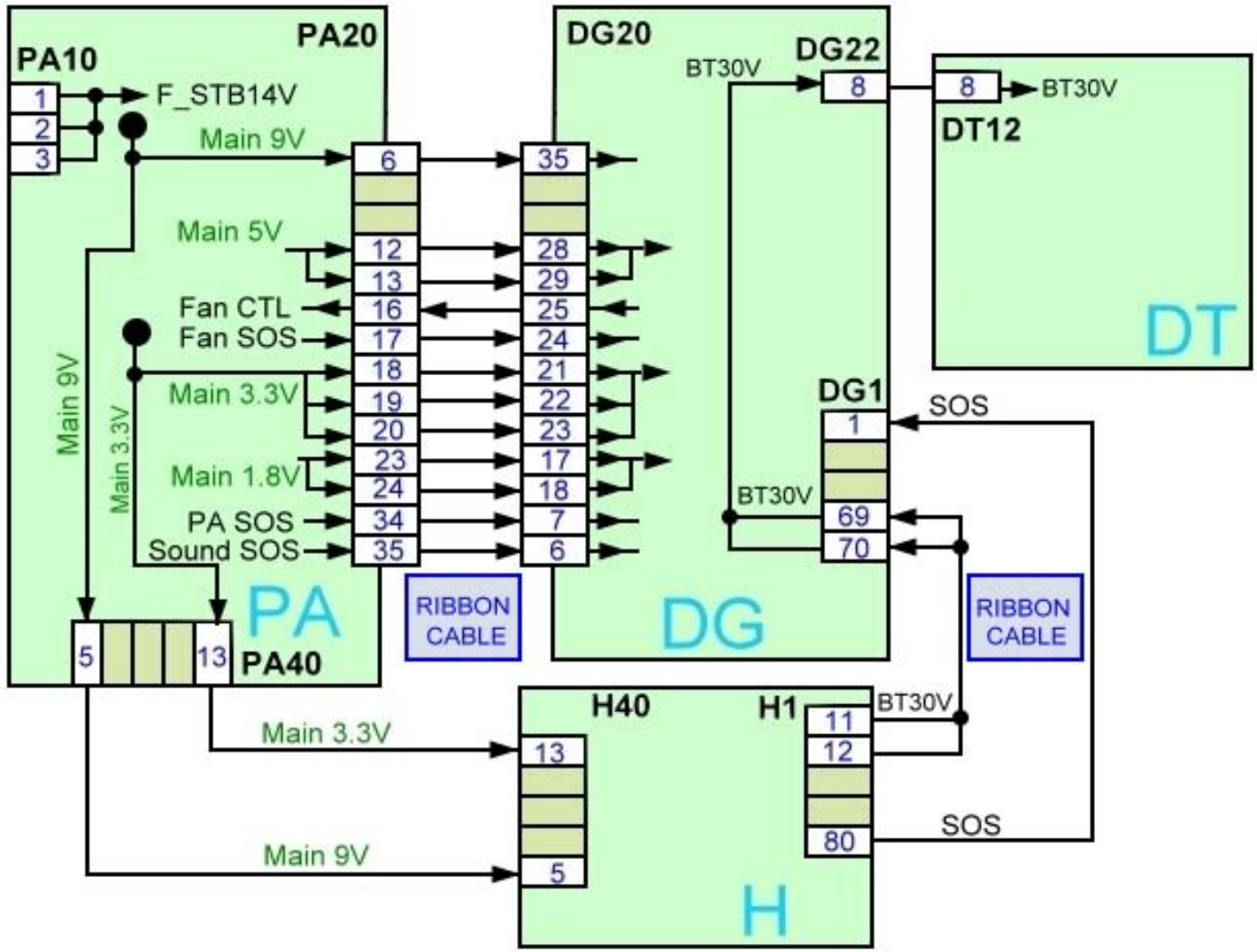
Power Supply Connectors



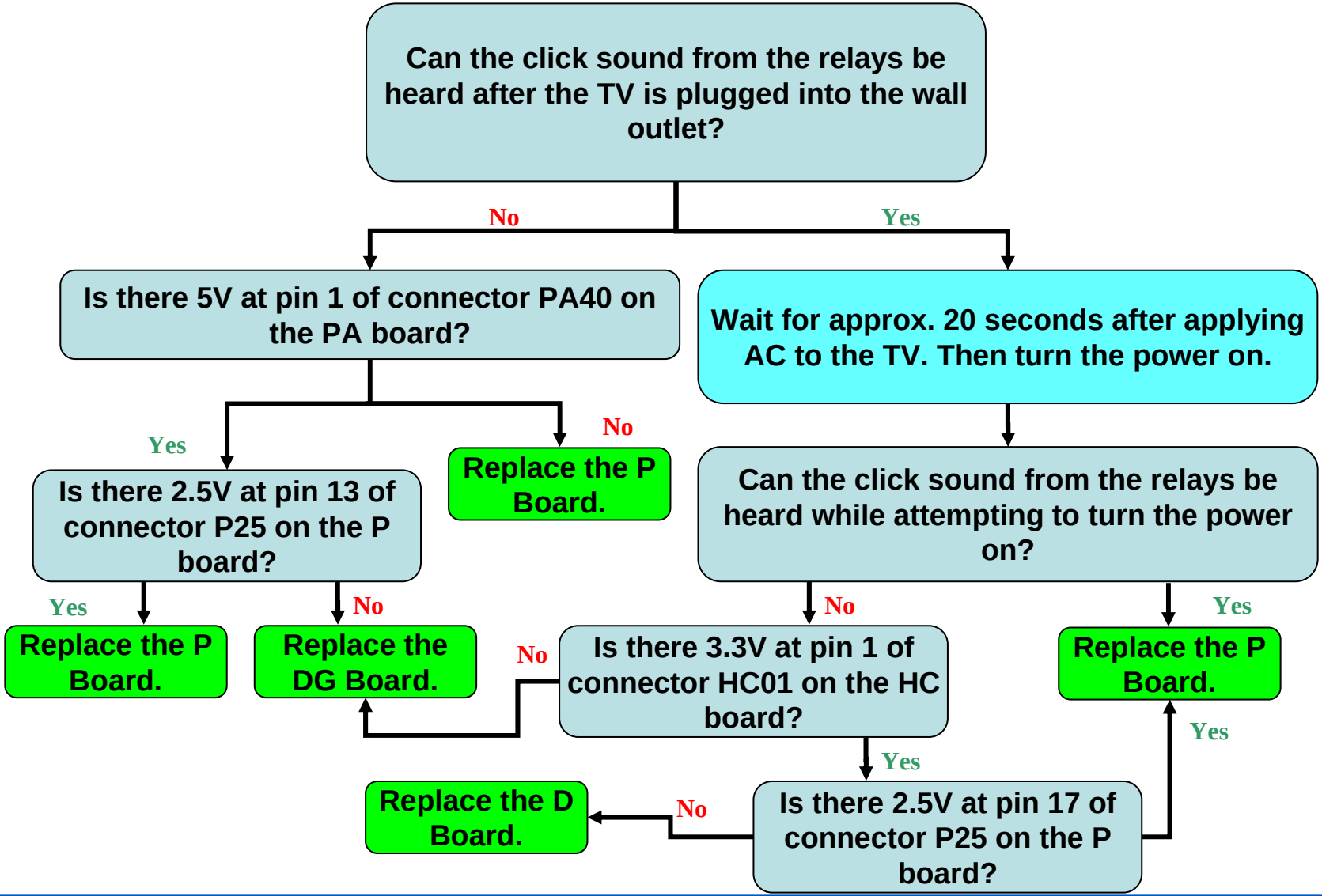
PA board Circuit Explanation



Main-Voltages Output From the PA Board



No Power Troubleshooting Chart



Shutdown Detect Circuits

Understanding how the SHUTDOWN circuit works

SOS

What will normally cause the TV to shut down?

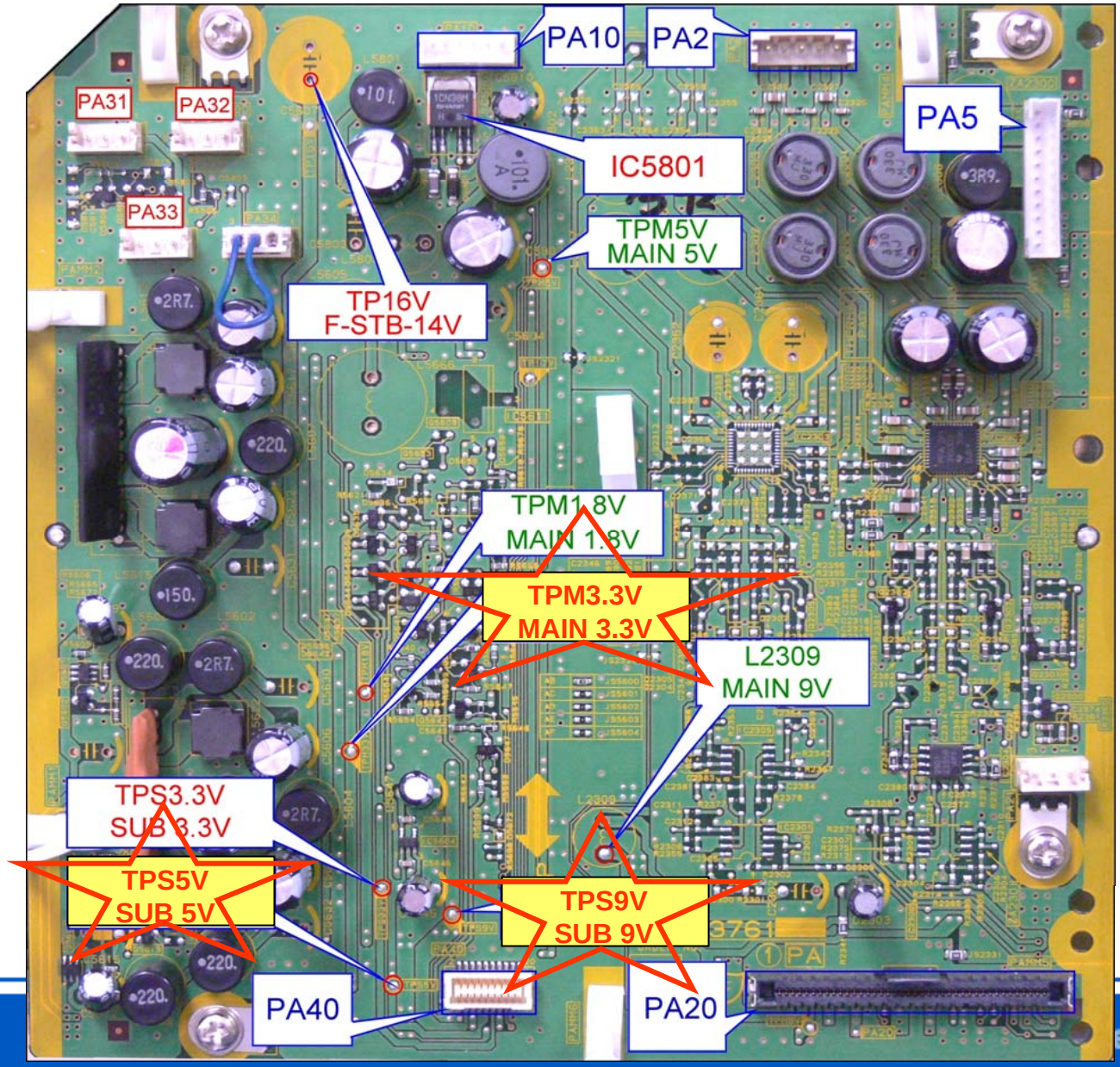
- A short circuit on any of the voltage lines
- An over-voltage condition
- Abnormality in the Control Drive Pulse circuit (SC, SU, SD, and SS boards)

Cases When Missing Voltages Can Cause the TV to Shut Down

- Missing the source voltage to the PA board (STB14V) from the P board
- Missing output voltage from the PA board to the DG board.
- Missing 15V or VSUS on either the SS or SC boards while the control drive pulses from the D board are being provided

Cases When Missing Voltages Can Cause the TV to Shut Down

If the SUB 5V, SUB 9V or MAIN 3.3V is missing on the DG Board, the unit goes into shutdown.
The power LED blinks ten times.
The voltages are monitored on the DG board by the MPU, IC1103.



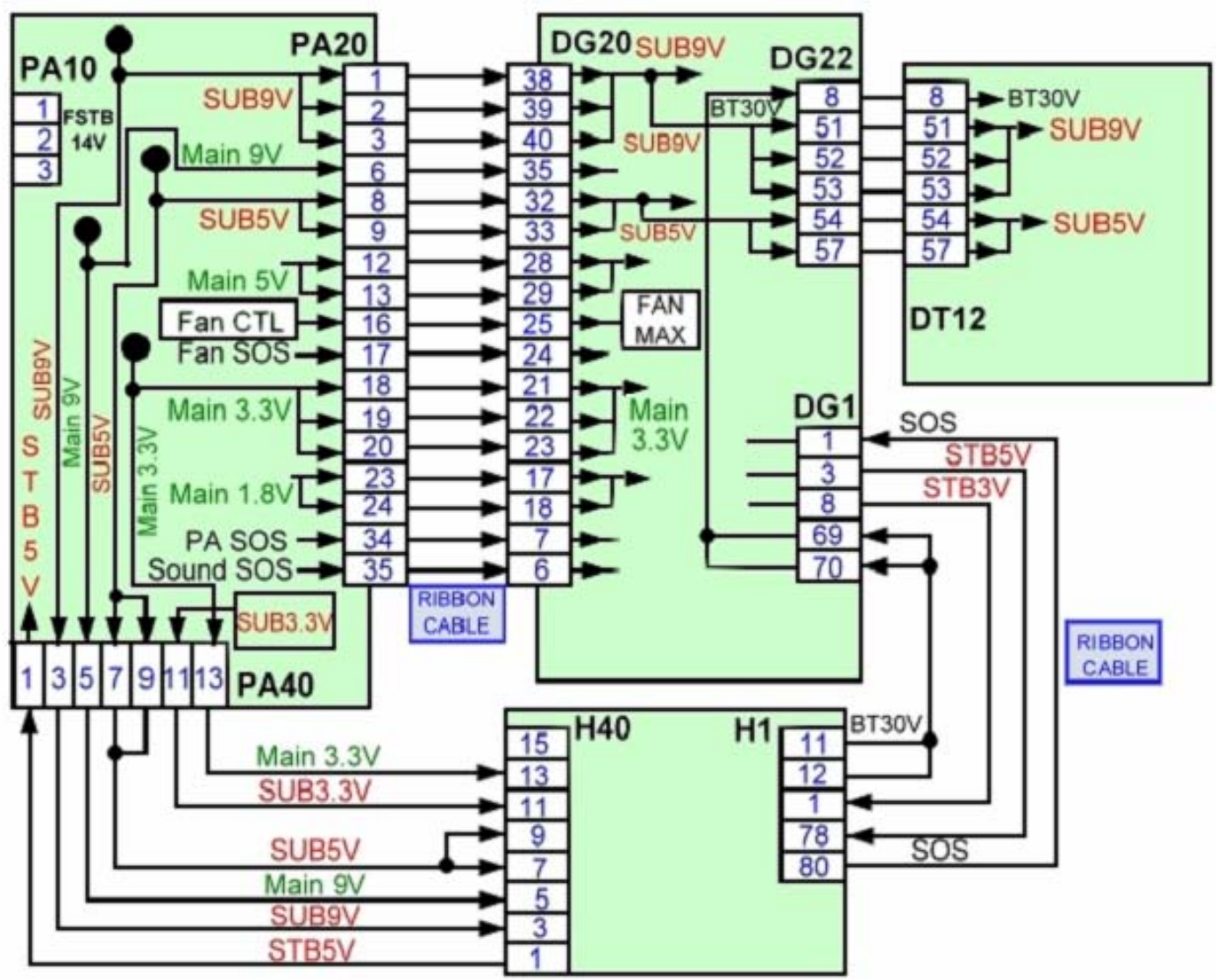
TV Shutdown due to Over-voltage or Short Circuit

This could happen if there's a short circuit in one of the B+ lines from the PA board, an over-voltage condition, or missing STB 14V from the P board.

PA Voltage Output

If any of the SUB or MAIN voltages that are high-lighted on the DG Board is missing, the unit goes into shutdown.
The power LED blinks ten times.

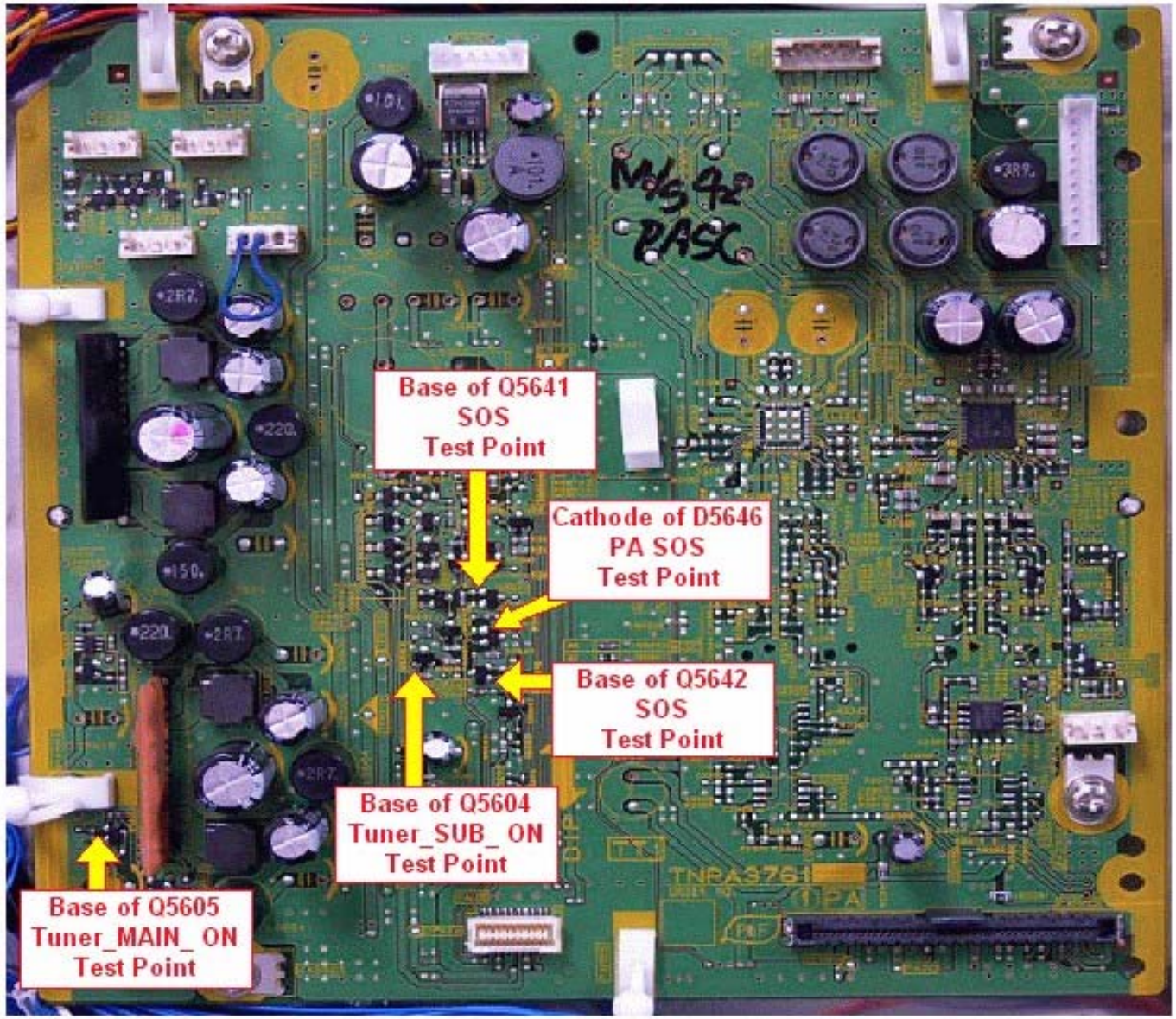
If any of the voltages created on the PA Board is excessive or shorted, the unit goes into shut-down.
The power LED blinks ten times.



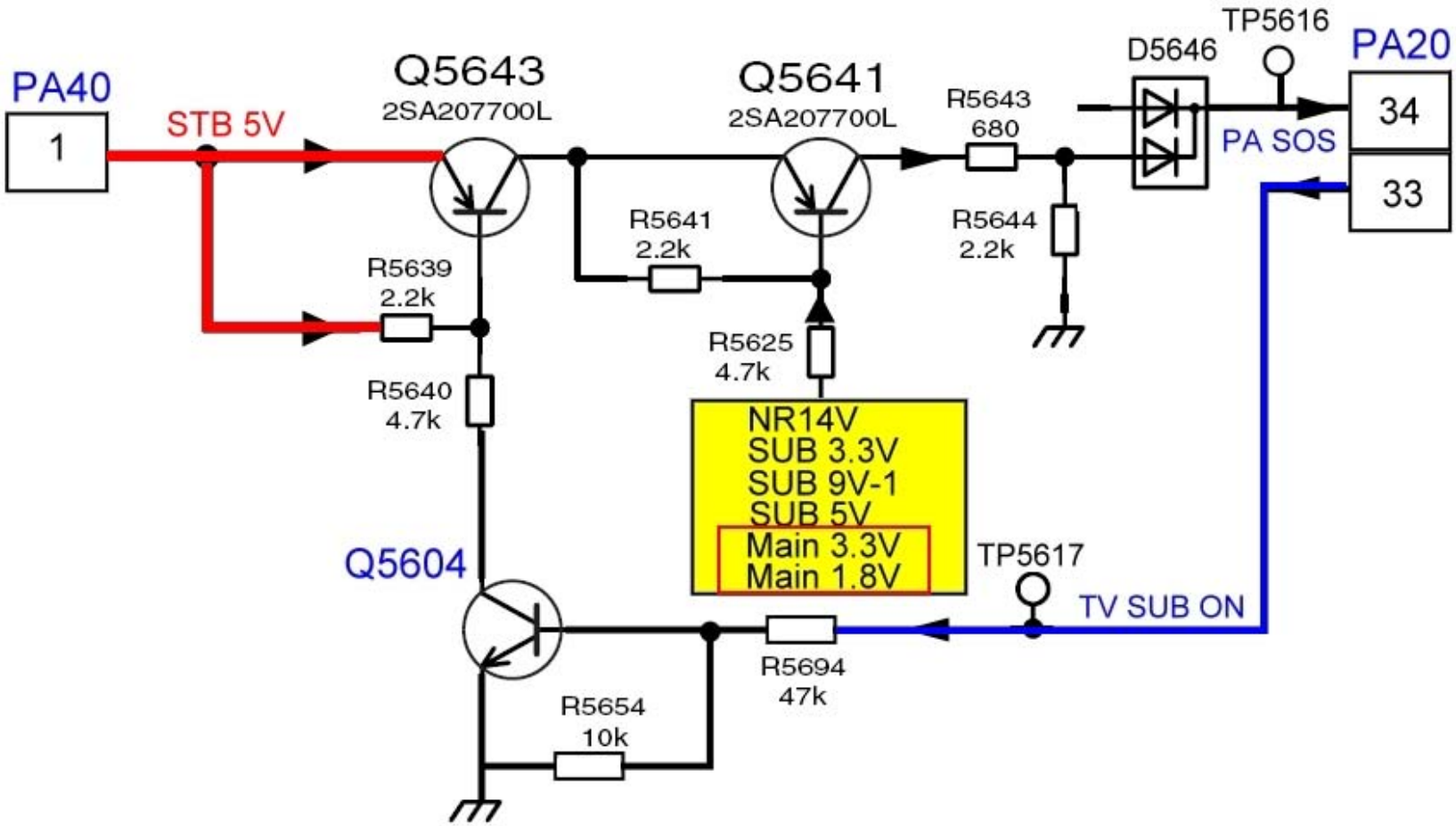
TV Shutdown due to Over-voltage or Short-circuit

The base of Q5642 being low indicates a short circuit in the Main 1.8V, Main 9V, or Main 5V output of the PA board.

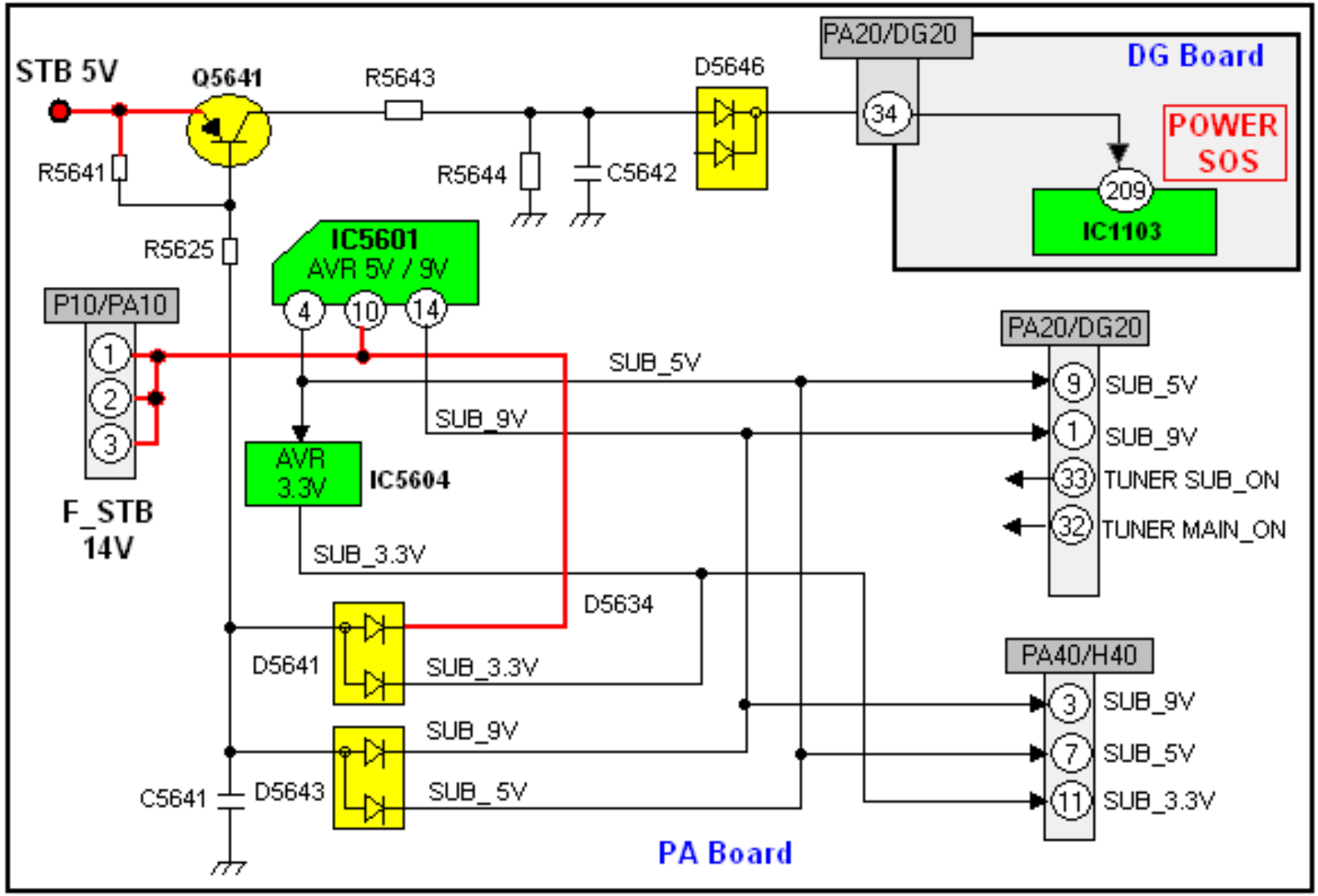
The base of Q5641 being low indicates a short circuit or an over-voltage condition in the NR14V, Main 1.8V, Main 3.3V, SUB 9V, SUB 3.3V or SUB 5V output of the PA board.



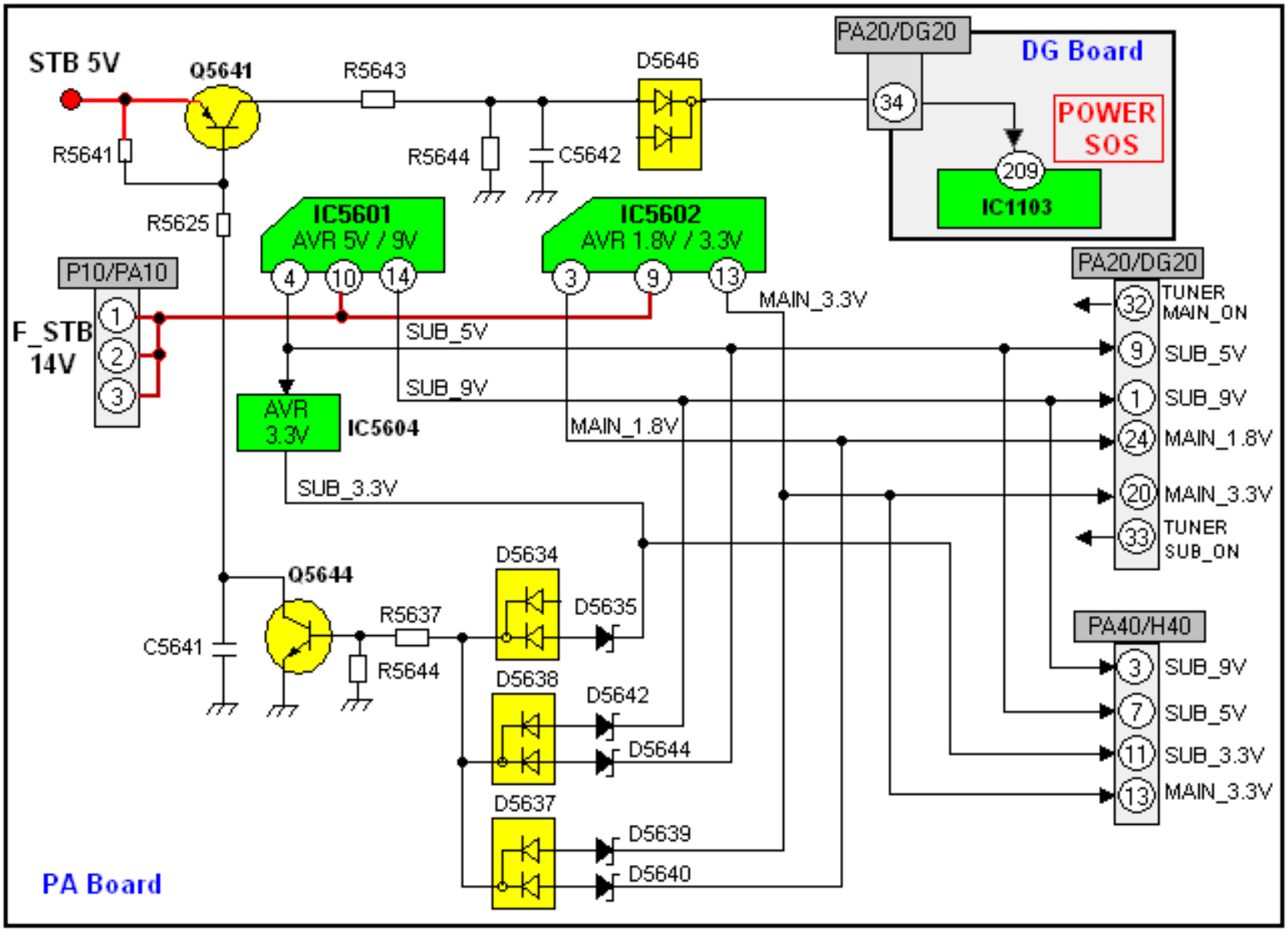
PA SOS Detect Circuit



PA-Board_Loss of Sub-Voltage Protection



PA Board_Over-Voltage Protection

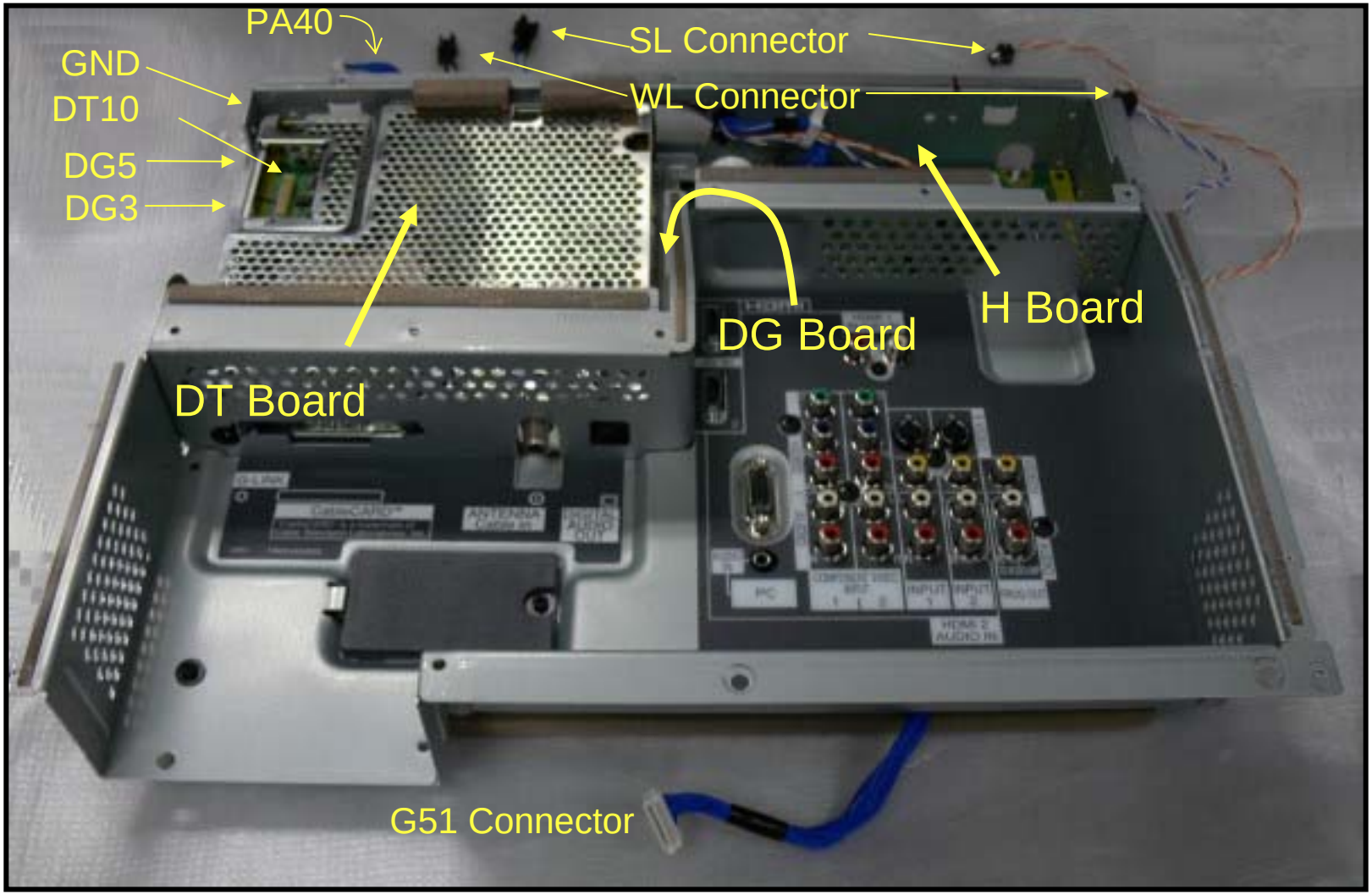


To rule out the P board (Use a Peak Hold Meter for voltage reading)

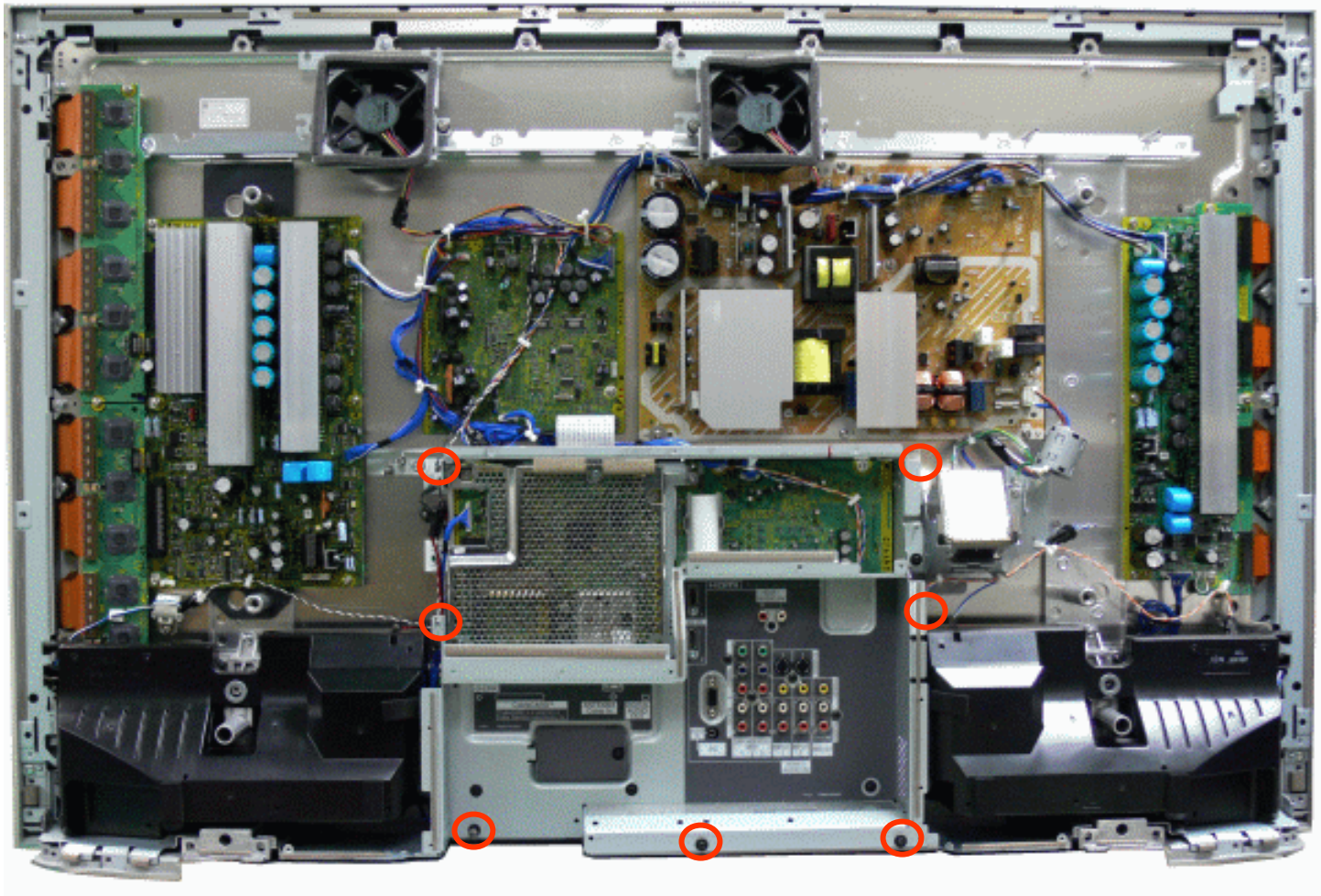
Note: Follow this procedure when the click sound of the relay can be heard after the unit is plugged in. If the relay does not click, check the STB 5V from the P board. If the STB 5V is missing, the P board may be defective. (If STB 5V is OK, the DG board may be defective.)

- Disconnect connector P10 in the P board (Make sure the TV is unplugged).
- Because you only have 2 to 3 seconds to measure the STB 14V, place your meter's probe at **pin 1 of connector P10** on the P board before plugging the TV to the AC line.
- Plug the TV to the AC line while still holding the probe at **pin 1**.
- Check to see if the 14V comes up. If it doesn't come up, the **P** board is defective. If it does, (since it may take some involvement to determine which of the PA or the DG board is defective) it's OK to order Both the **DG** and **PA** boards together.

DT, DG, H Board Assembly



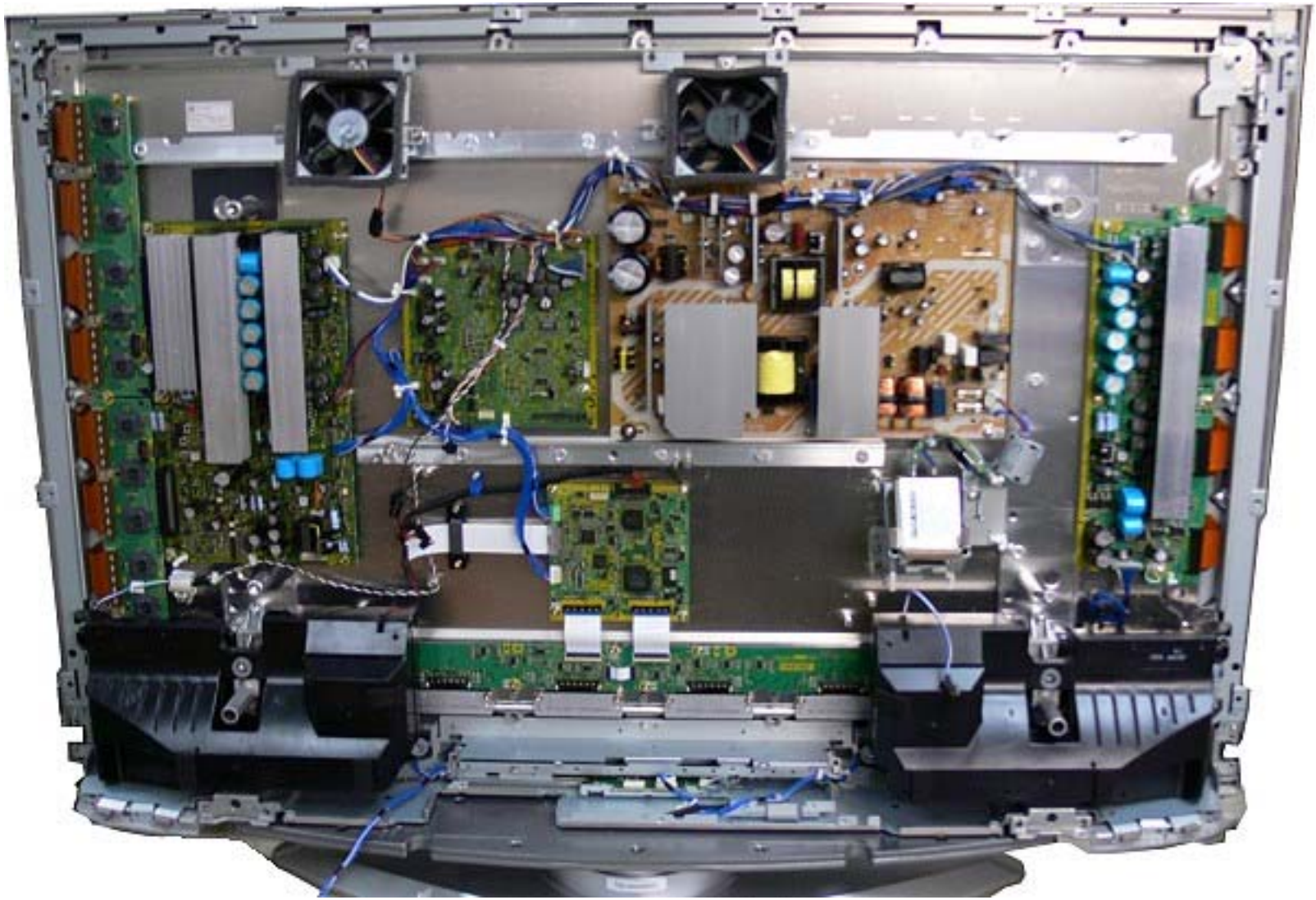
Removal of Board Assembly



To uninstall the board assembly, remove the 7 screws indicated by the red circles

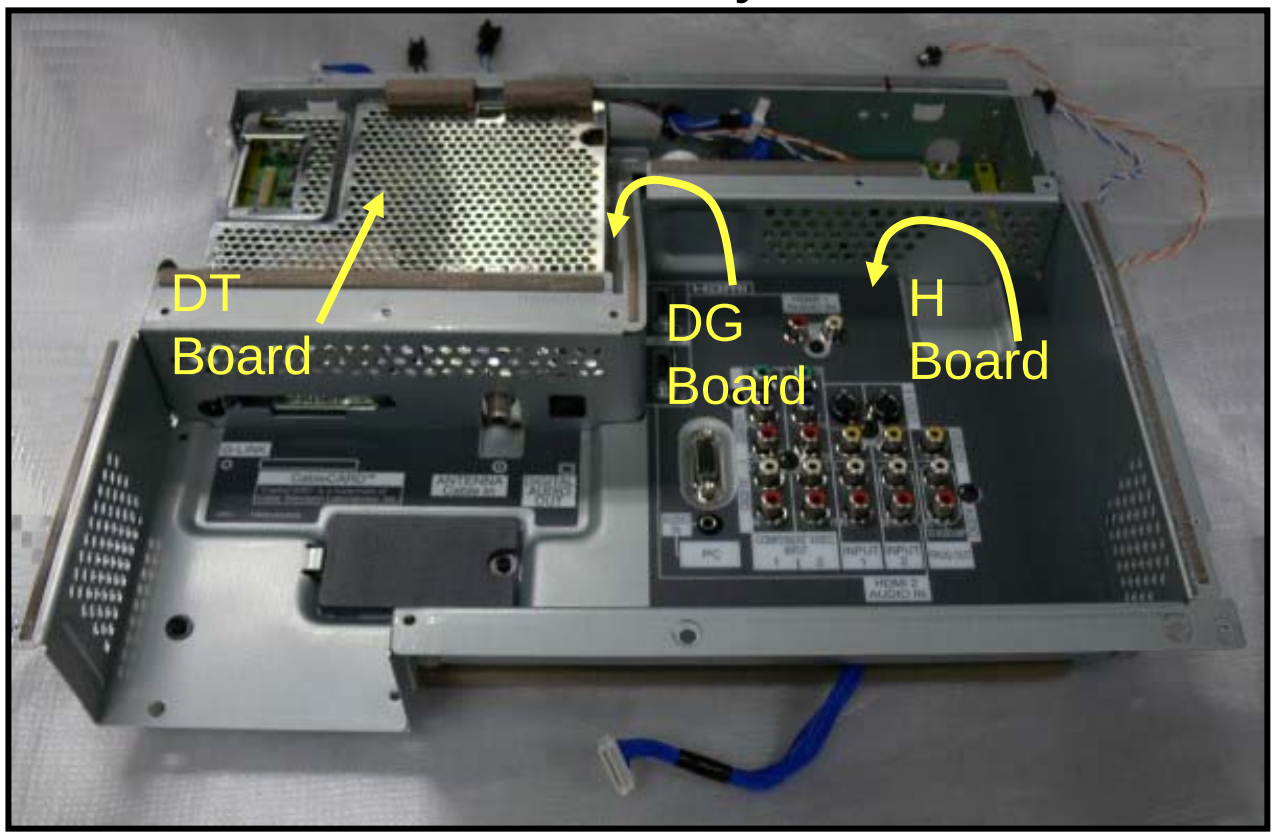
Board Assembly (Hidden Connector)

Board Layout Without the Assembly



Power LED blinks 10 times

When the power LED blinks 10 times right after the TV has been plugged-in into the AC line and the Power is OFF, the P, the PA, the DG, the H, or the DT may be defective.



The DT, DG, and H board are part of the assembly. For troubleshooting, the DT board must be removed.

To rule out the H board:

Disconnect connector **H40** and plug the TV into the AC line

Note: If the Power LED stops blinking, the **H** board may be defective.

If the power LED still blinks, See the next slide.

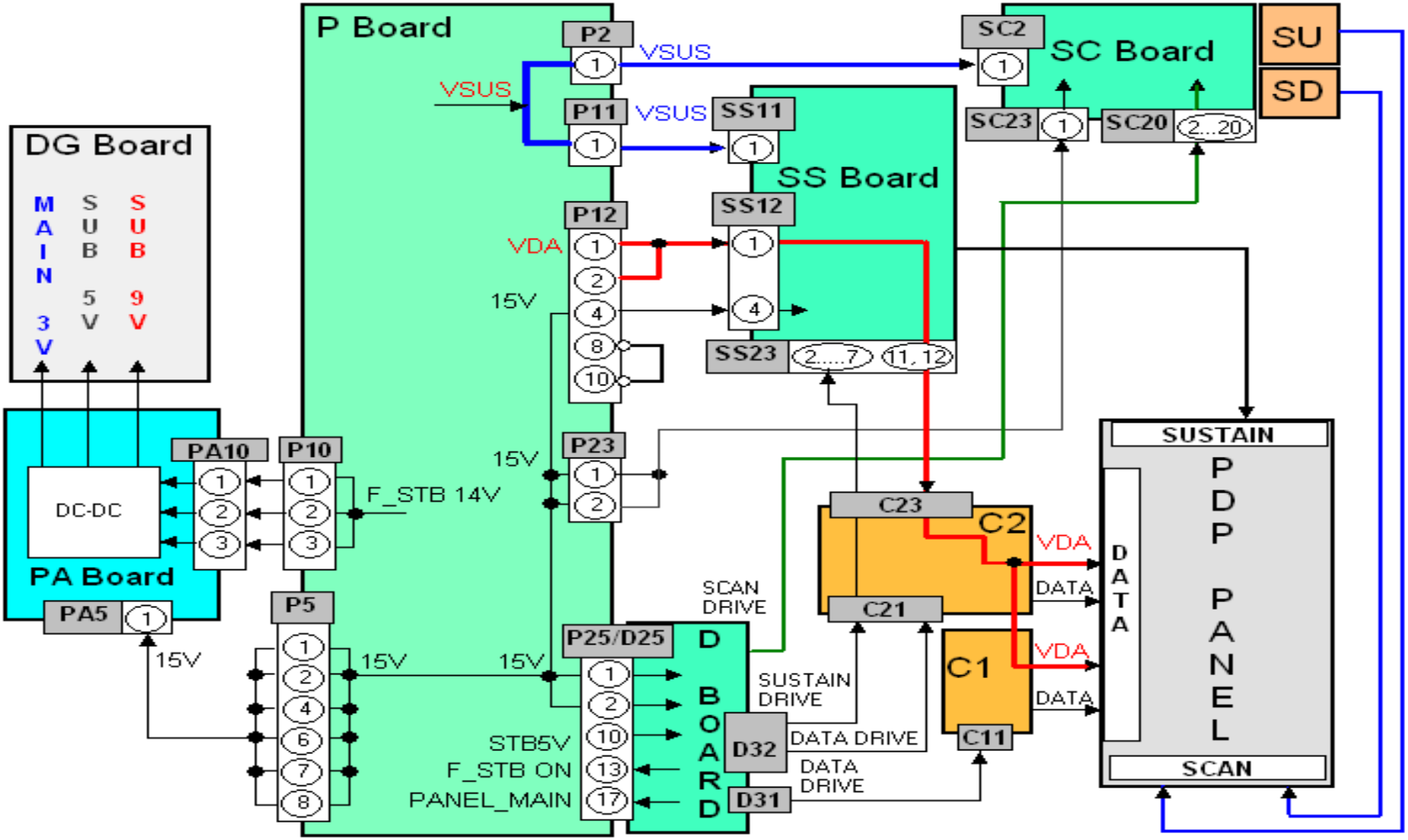
Keep in mind, every time the H board is suspected to be defective, change both the PA and the H board at the same time before applying power to the unit.

Power LED blinks 10 times

To rule out the DT board (Digital Tuner):

1. Remove the screws securing the DT board. Plug the TV into the AC line.
2. Note: If the Power LED stops blinking, the **DT** board may be defective.
3. Note: When the DT board is removed, the unit will power up with all functions disabled due to a lack of data communication.
4. If the Power LED still blinks, it is possible that the problem is the **PA** or the DG board.

10 Blinks Due to VSUS or VDA Voltage



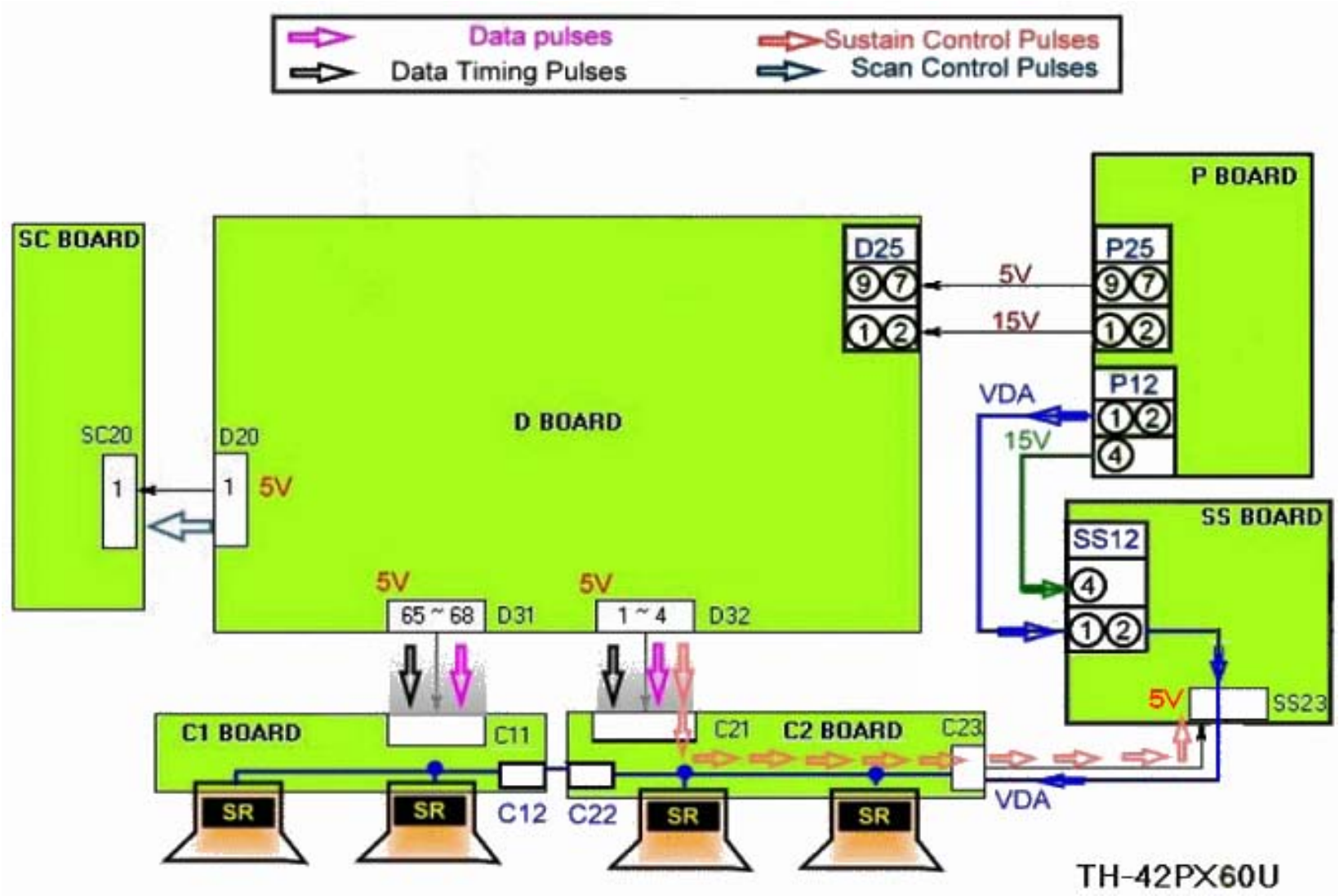
Power LED blinks 5 times

This is caused by abnormalities on the 5V line.

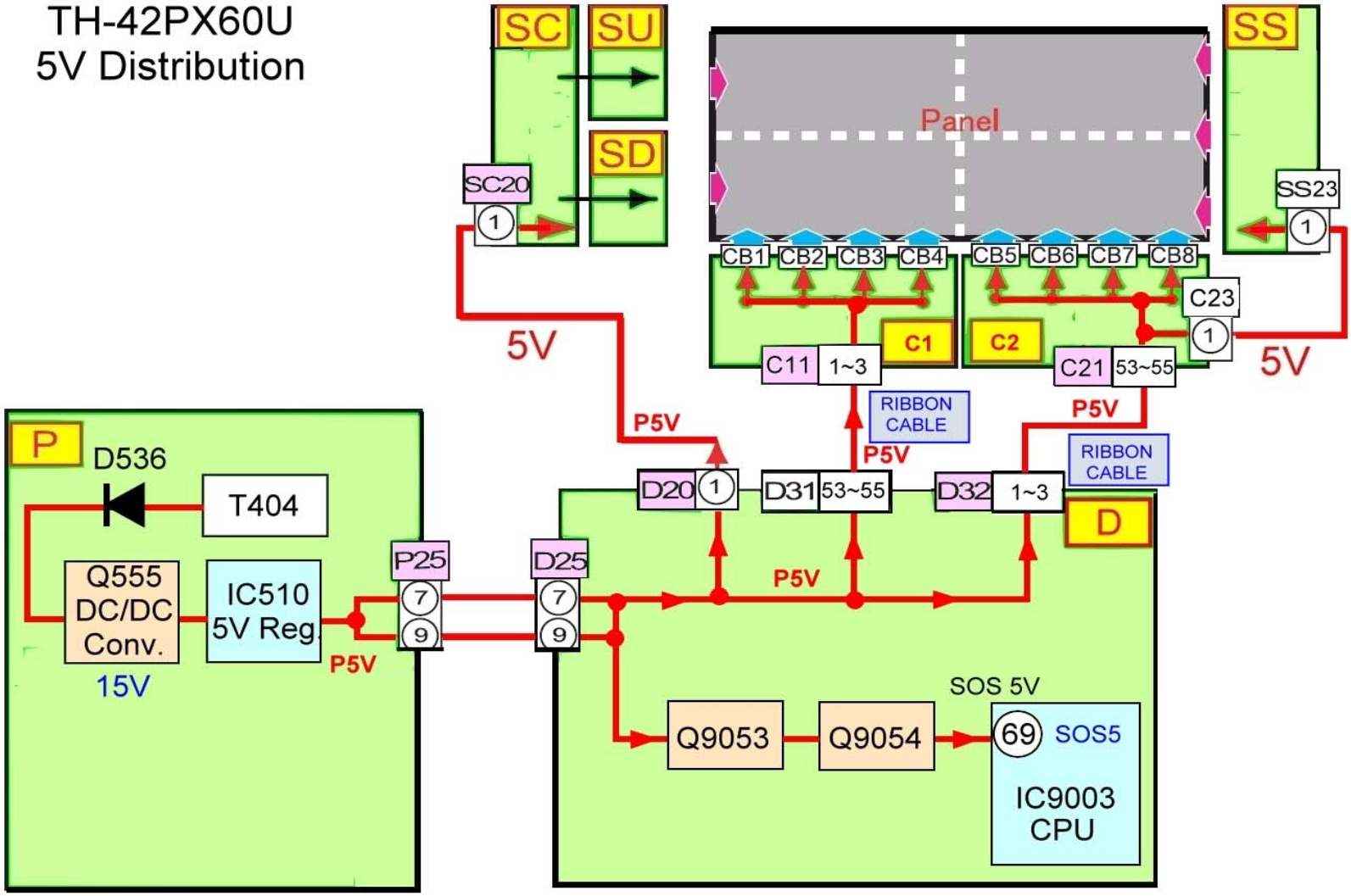
This could also happen if the VDA voltage is shorted.

SOS

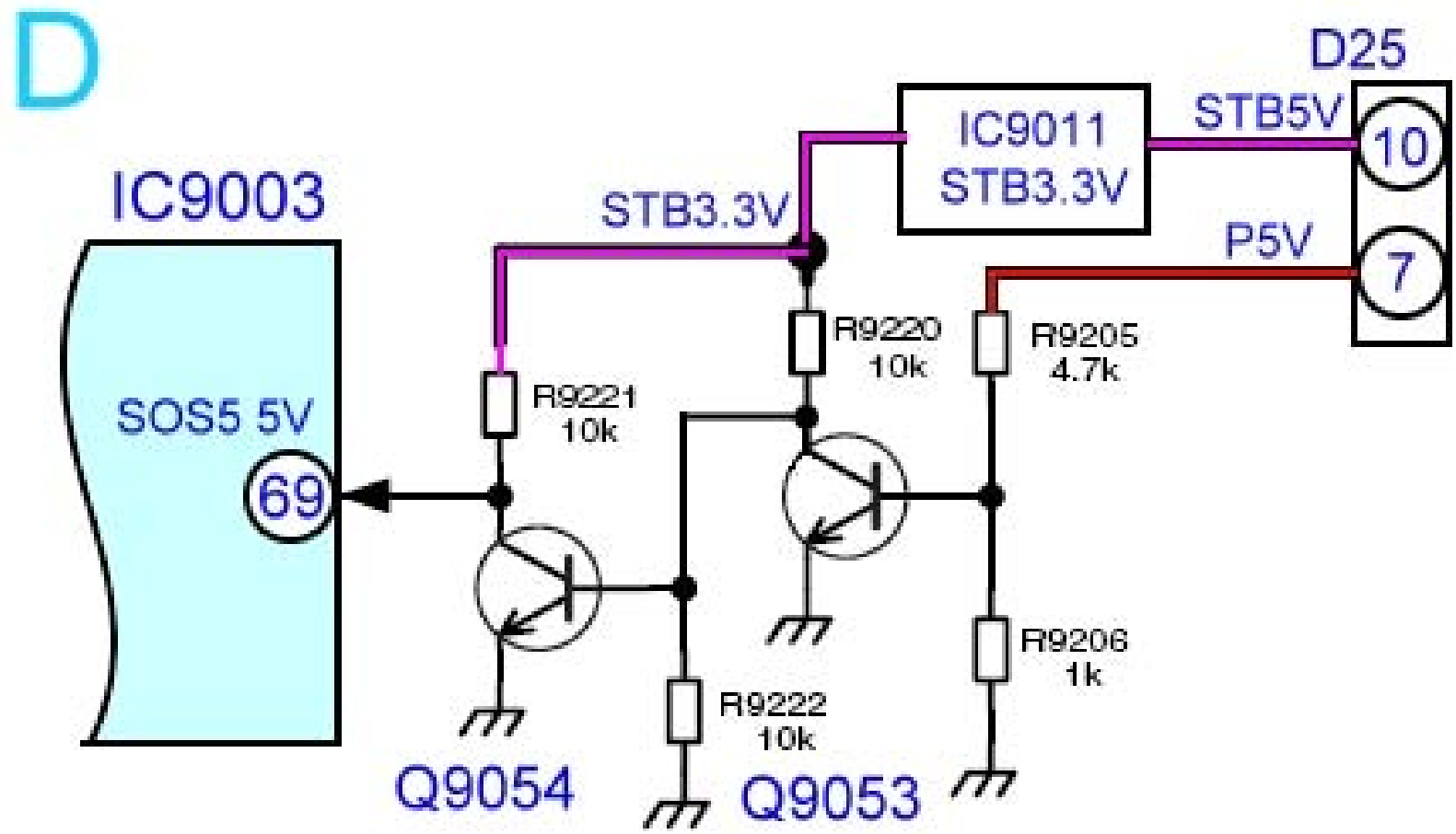
5V, VDA, Data, Scan, Sustain Distribution



5V Distribution



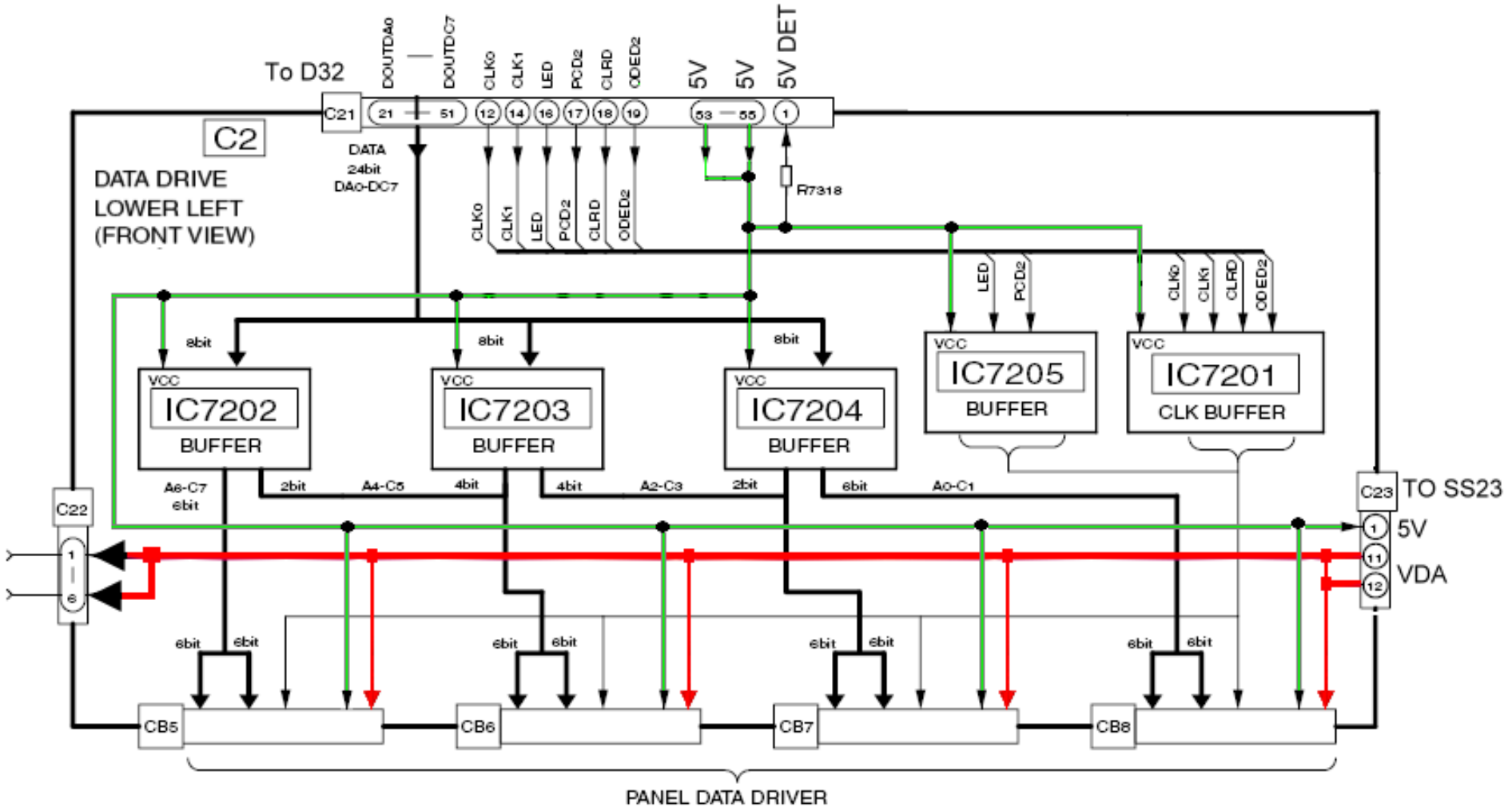
5V SOS Detection Circuit



Other Causes of 5V SOS

- The Power LED could also blink 5 times if the VDA voltage is shorted [Normally by the Panel (de-multiplexer ICs)].
- To understand the reason, see the next slide

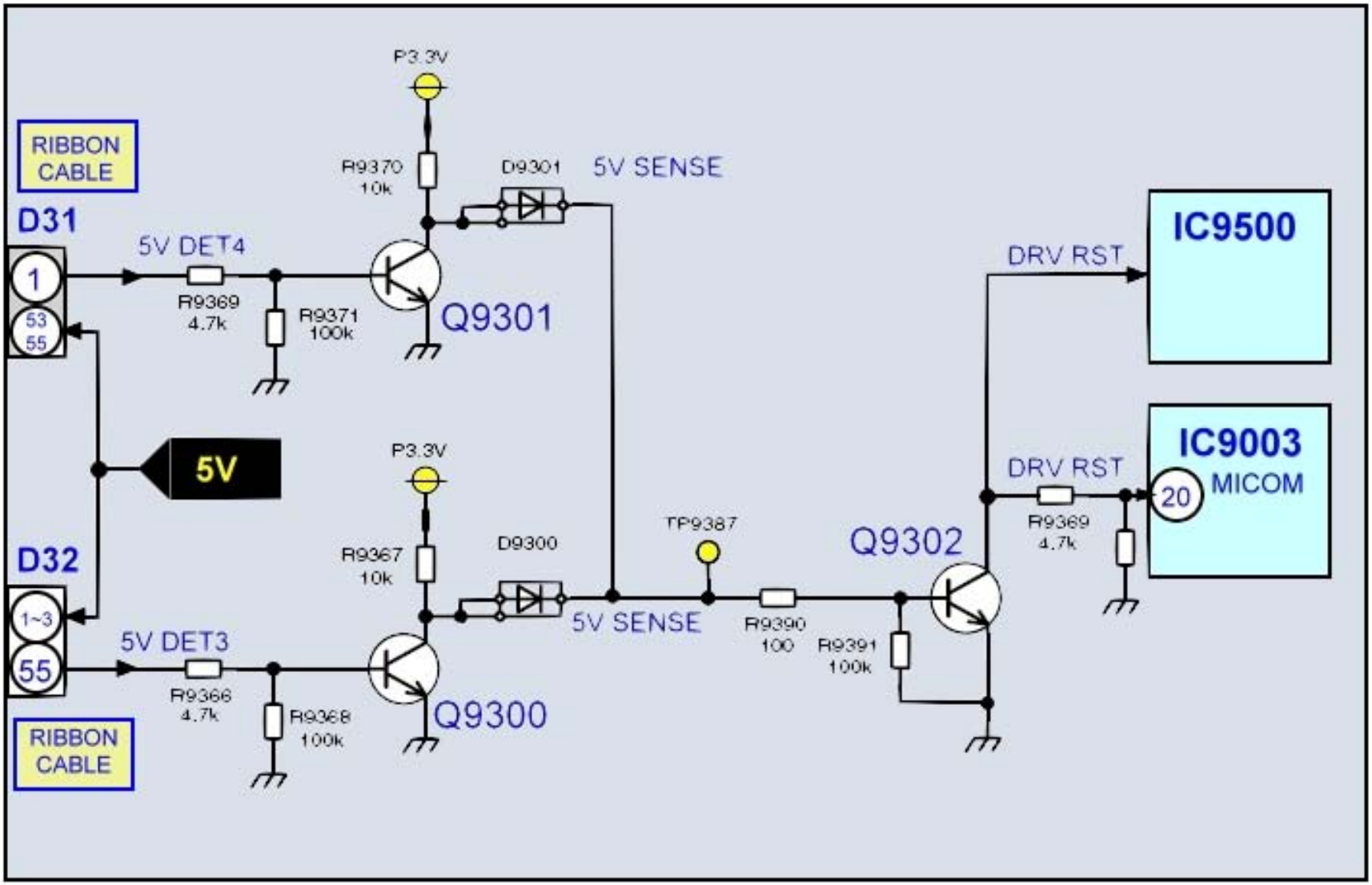
5V and VDA Distribution on the C Board



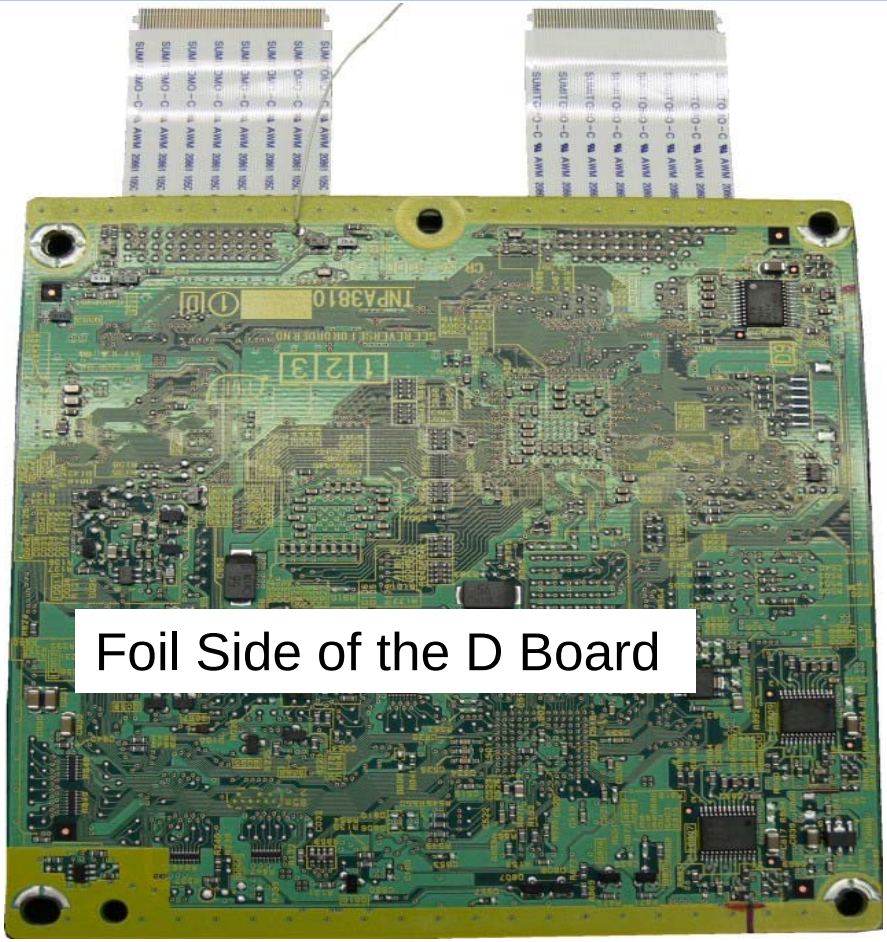
How to properly isolate the C boards

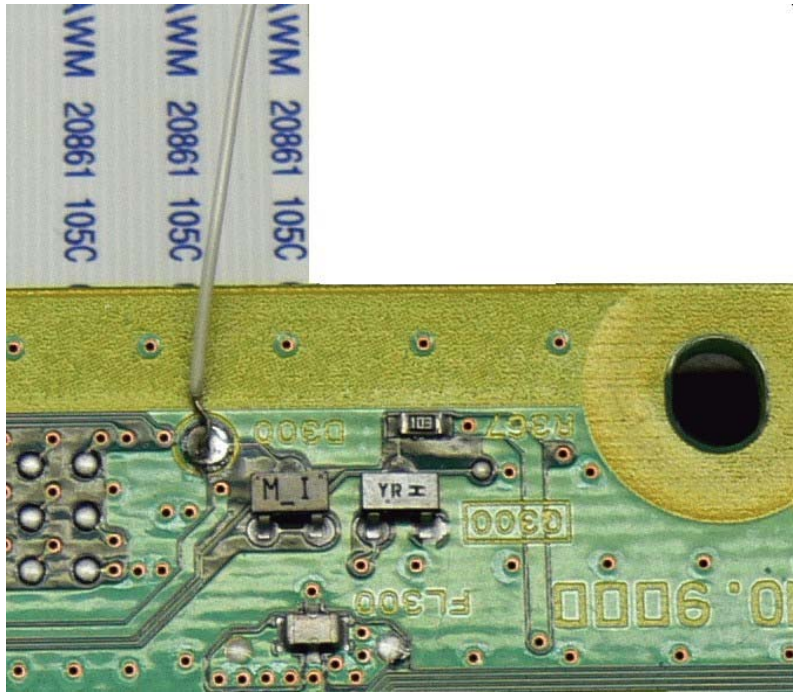
- When the ribbon cables from the D board to the C boards are disconnected in order to isolate the C boards, the Power LED will blink 6 times.
- The following circuit explains the reason why.
- To properly isolate the C boards without having the Power LED blink, the test point TP9387 (Labeled TP9387 on the D board) should be grounded through a 1K resistor.
- The VDA connector should be also disconnected.

Drive Reset Circuit



Drive Reset Circuit Test Point

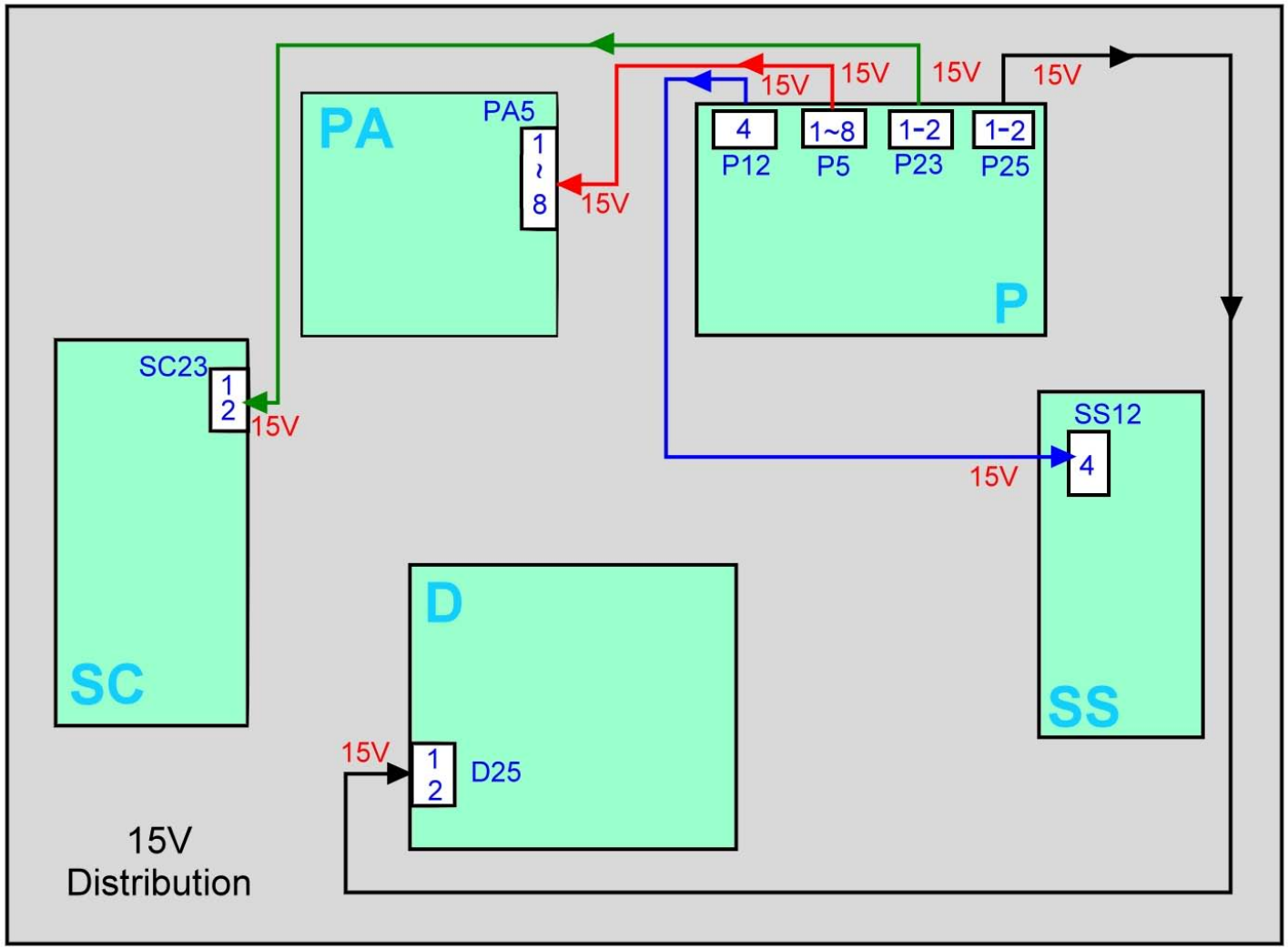




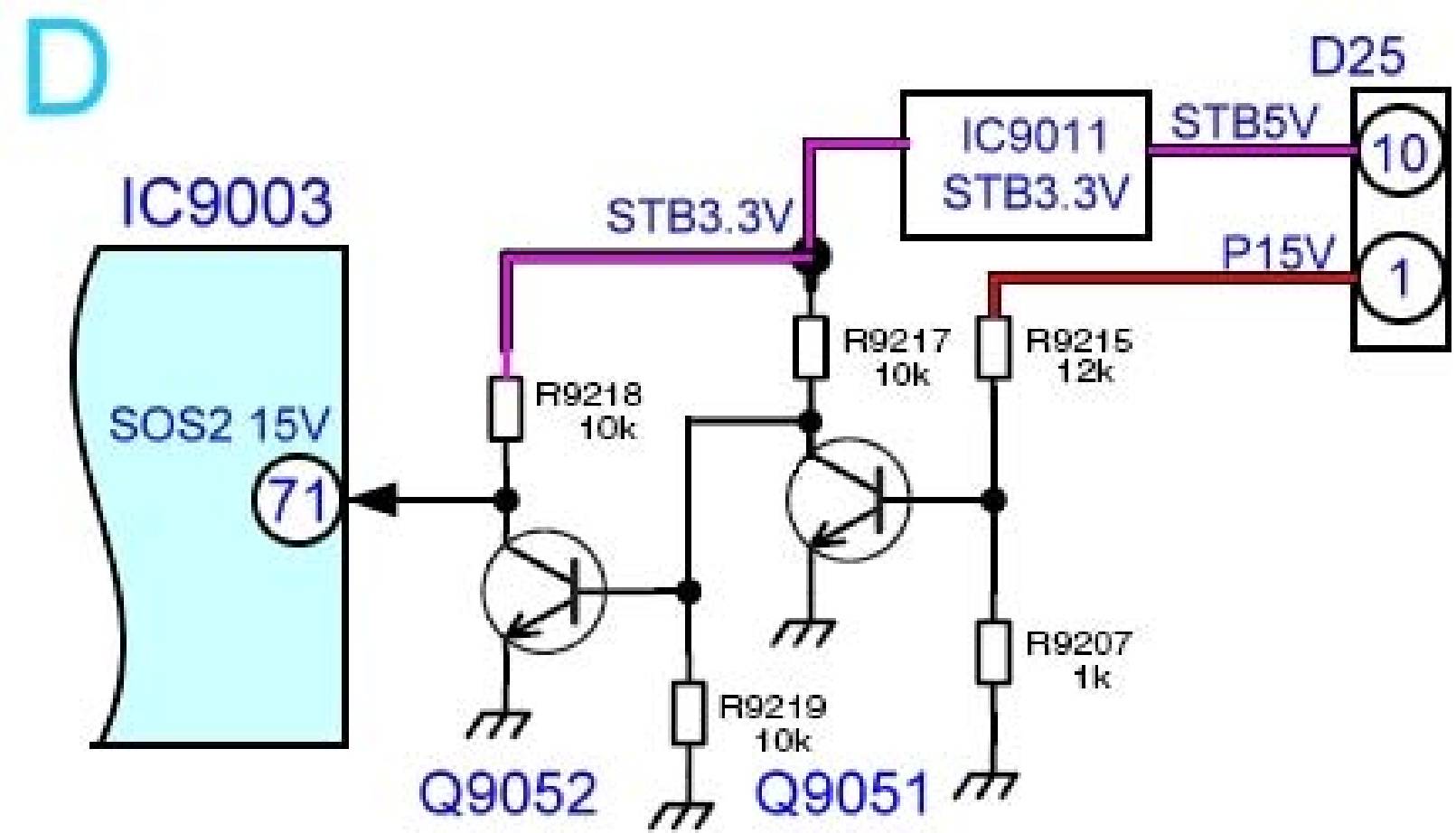
TP9387 is not shown on the board.

The test point shown in these pictures is a substitute for TP9387. It is located on the foil side of the board. To make the ground connection, the board has to be removed.

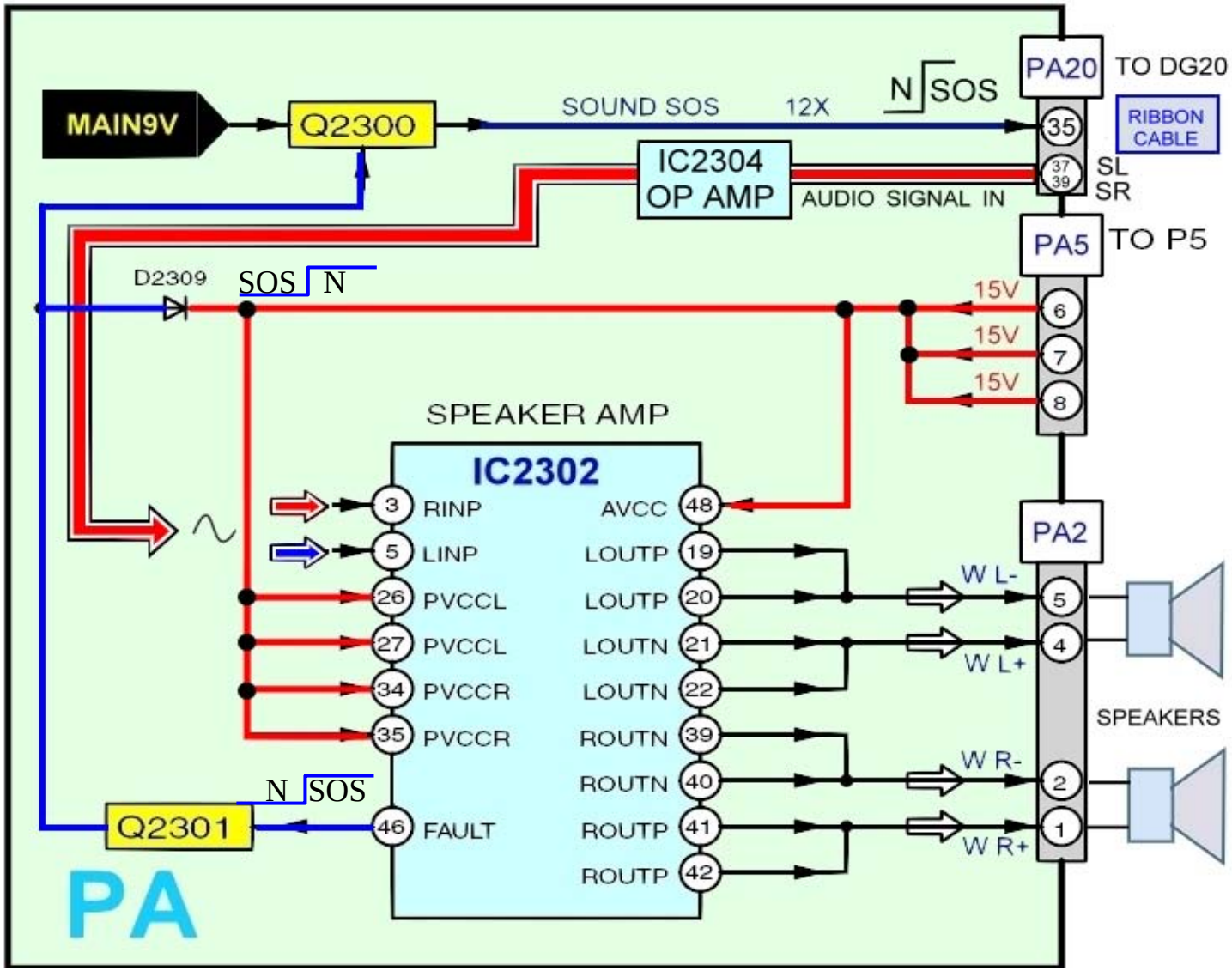
15V Distribution



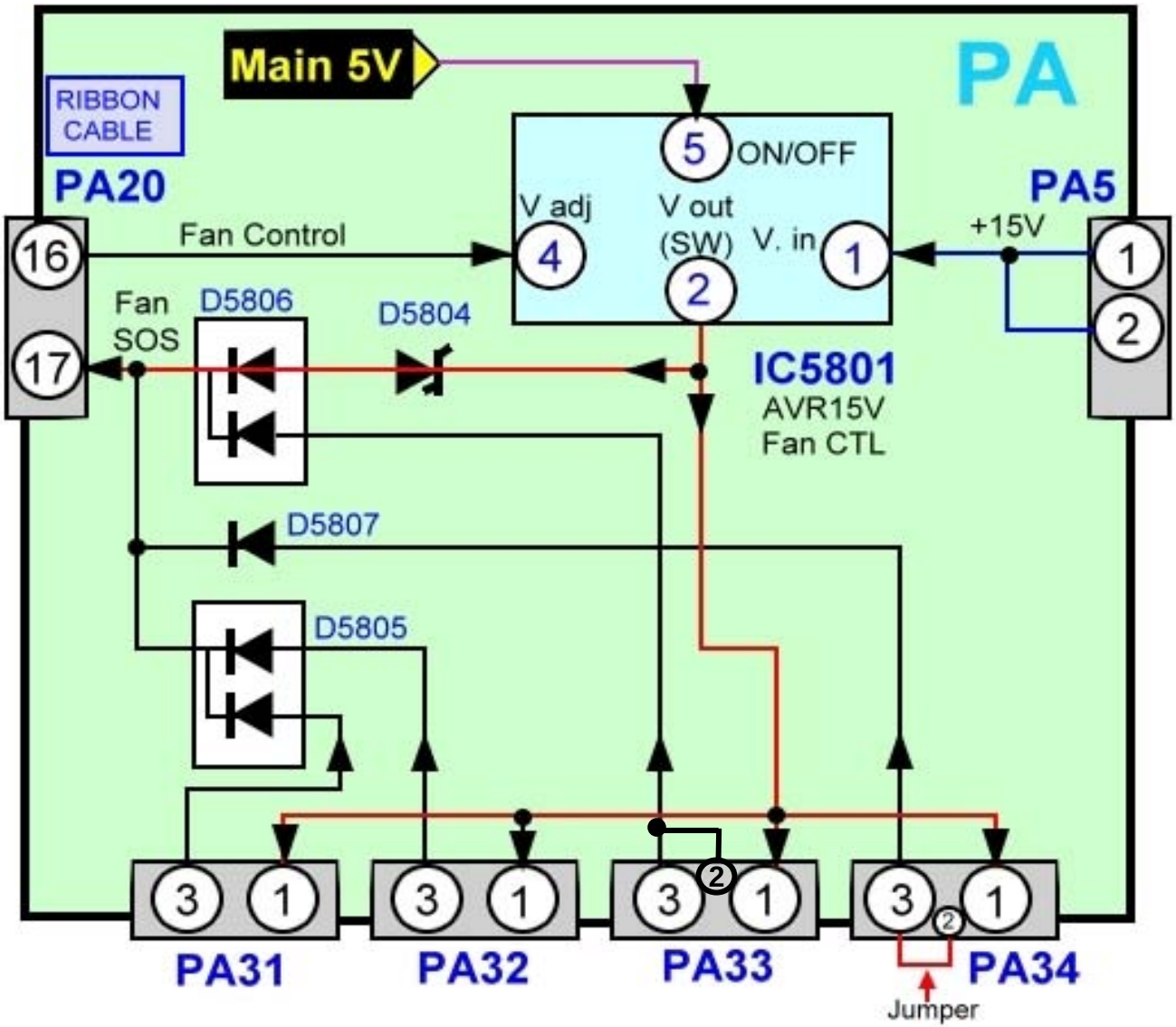
15V SOS Detection Circuit



Sound SOS Detection Circuit



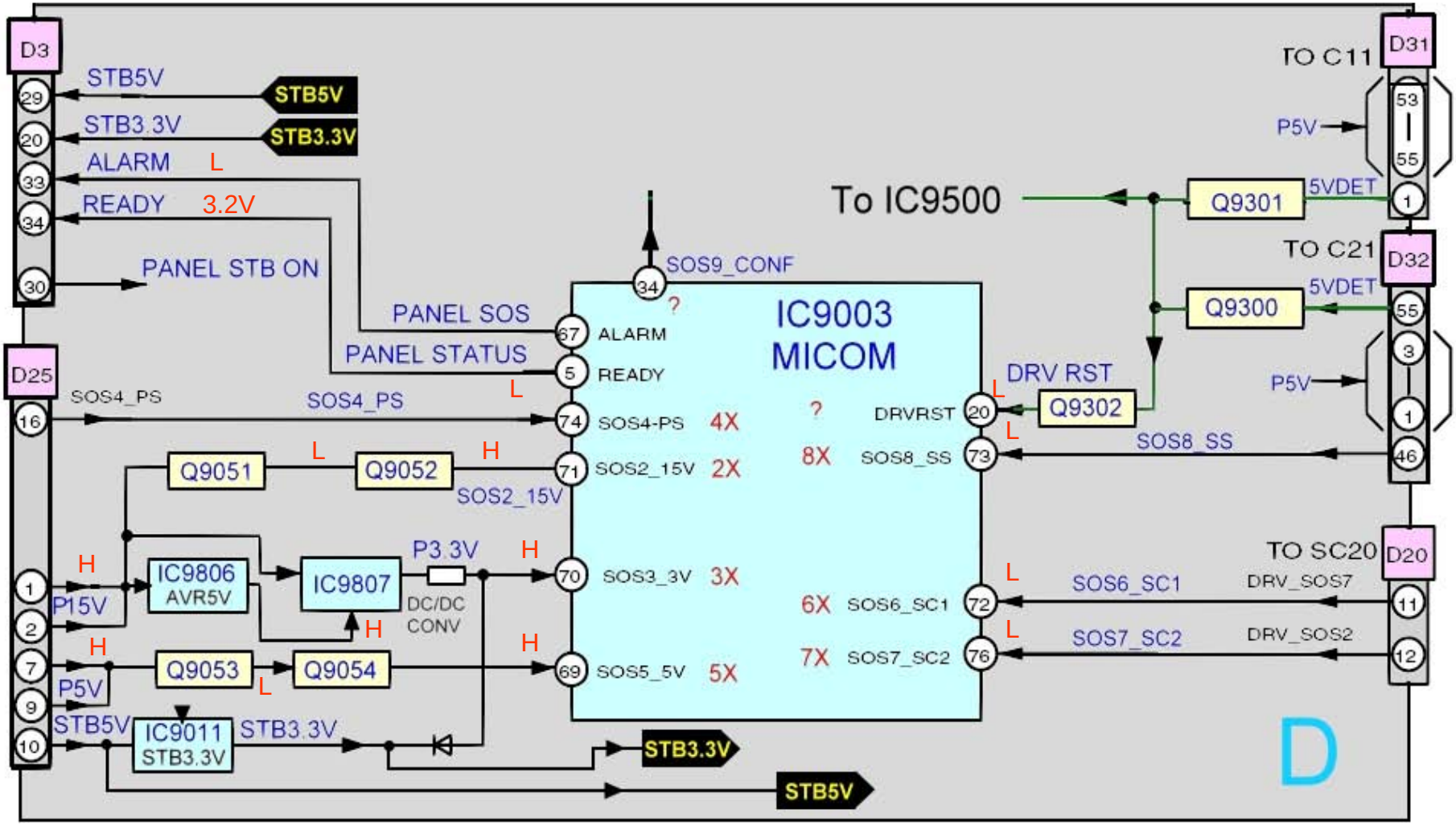
Fan SOS



Fan SOS

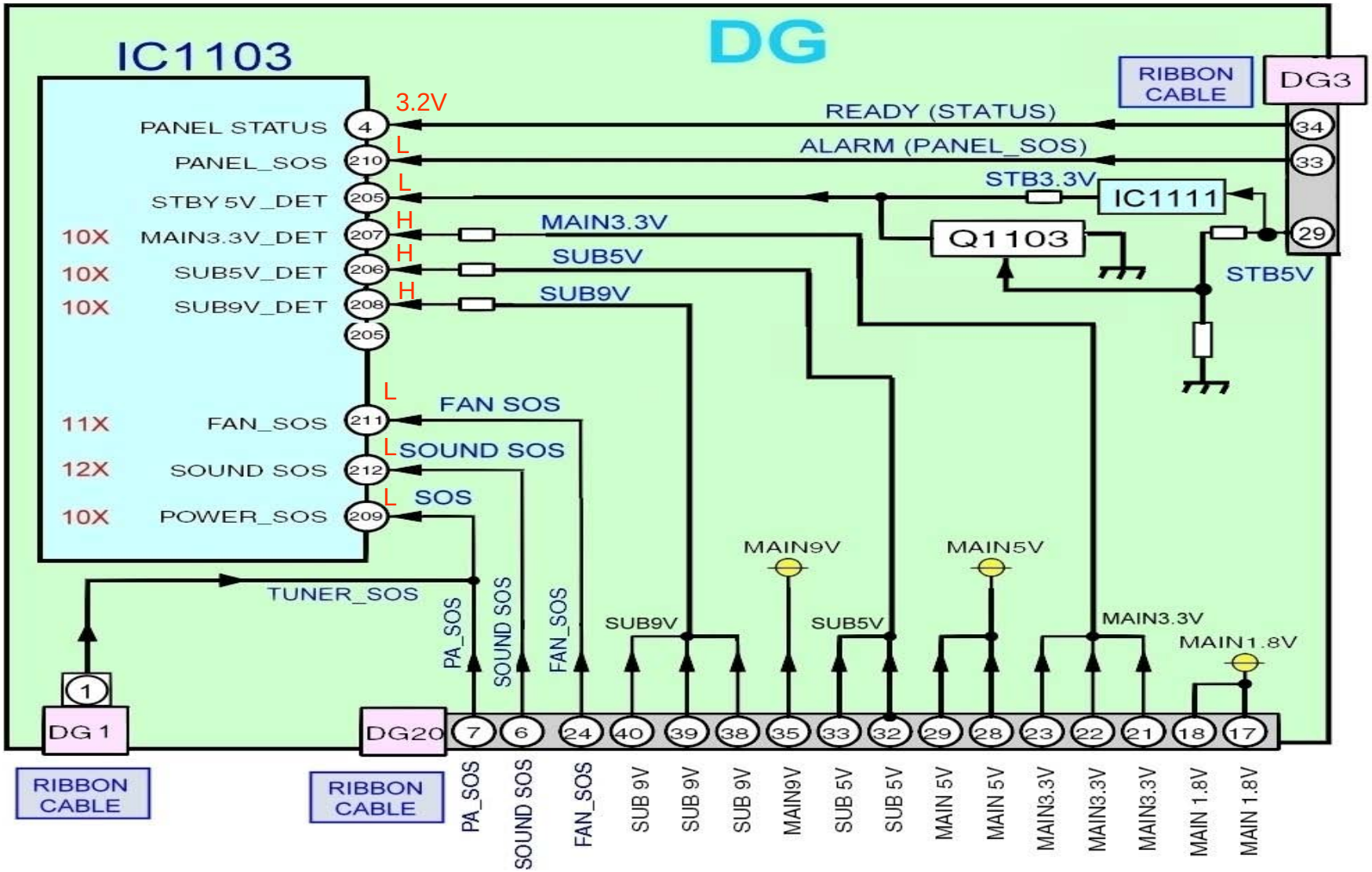
To determine if a fan is the cause of the 11 blinks of the power LED, simply use a peak-hold voltmeter to determine if pin 3 of the fan connector goes High before shutdown. If it does, the fan is defective. If it does not, check the other fans and the fan drive drive circuit.

D Board SOS Detect

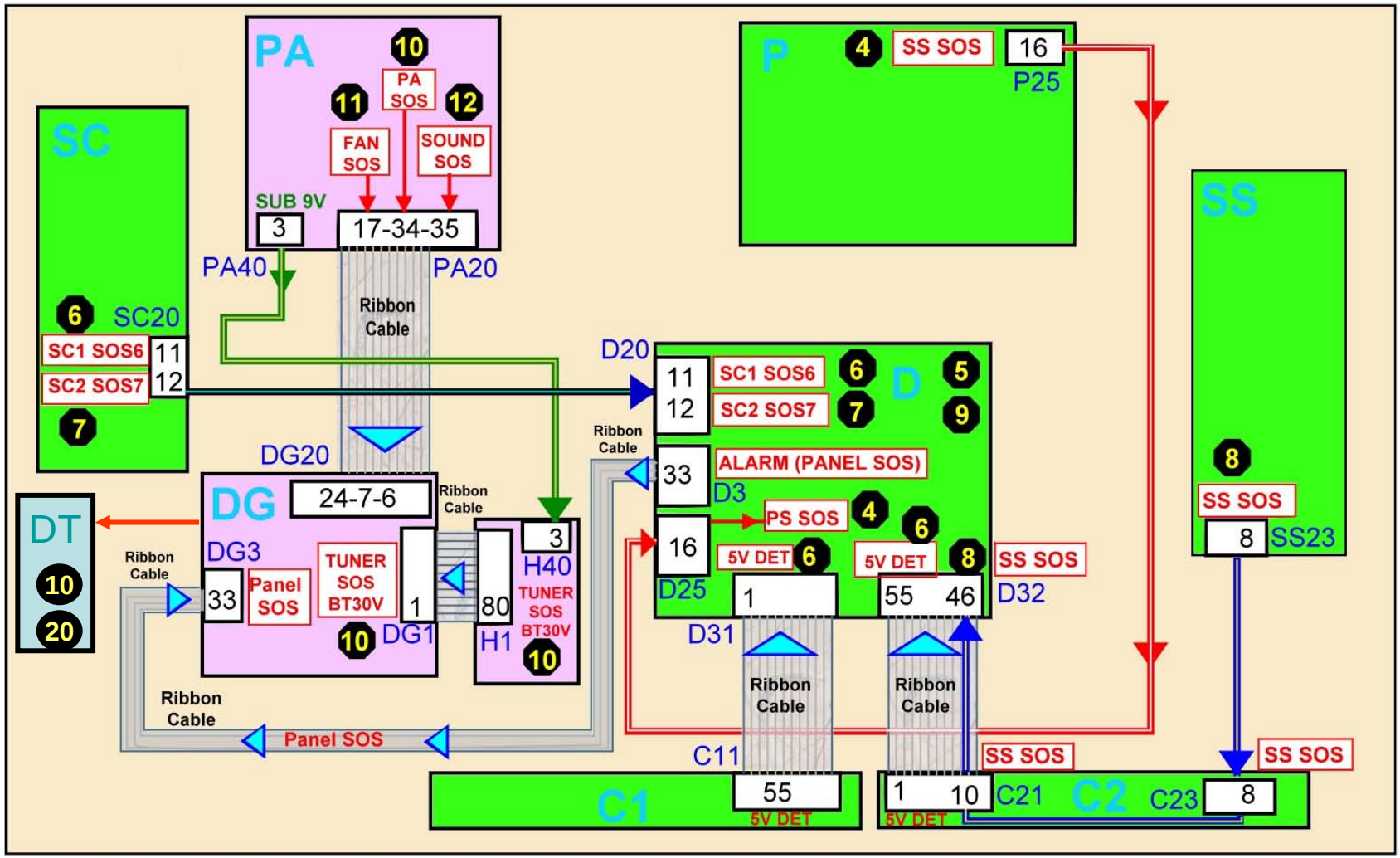


H (High) or L (Low) = Logic State during normal operation

DG Board SOS Detect



Origin of Power LED Blinks



D Board SOS Detect

D Board SOS Detect		
SOS LINE	LINE MONITORED	NUMBER OF TIMES THE POWER LED BLINKS
SOS 2	15V	2 BLINKS
SOS 3	P3.3V (15V & STB5V)	3 BLINKS
SOS 4	PS	4 BLINKS
SOS 5	5V	5 BLINKS
SOS 6	SC1	6 BLINKS
DRVRST	5V DET	6 BLINKS
SOS 7	SC2	7 BLINKS
SOS 8	SS	8 BLINKS
SOS 9	CONF. DC LEVEL SHIFTER	9 BLINKS ?

DG Board SOS Detect

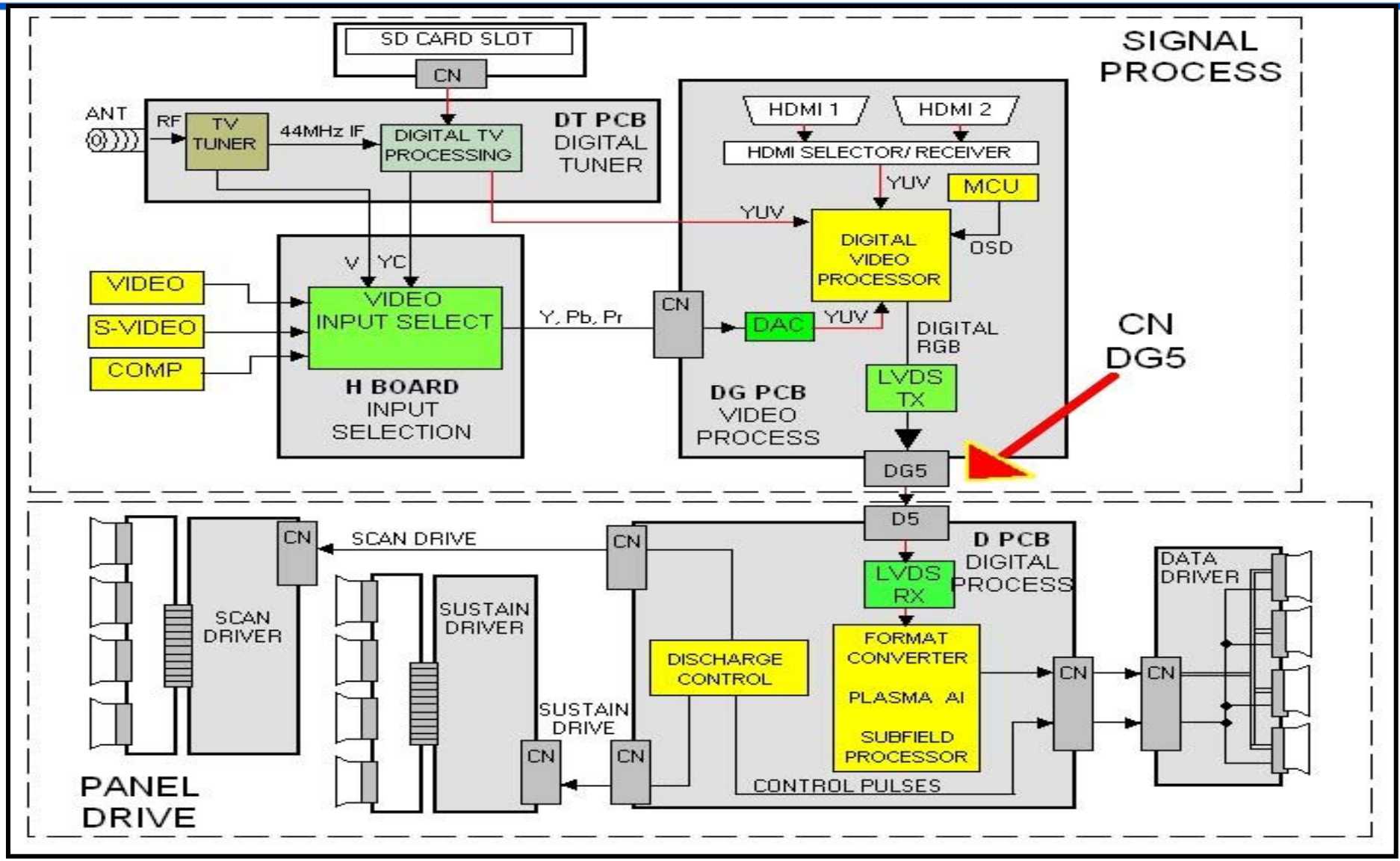
DG Board SOS Detect		
SOS LINE	**LINE MONITORED**	**NUMBER OF TIMES THE POWER LED BLINKS**
STB 3.3V DET	STB 3.3V	10 BLINKS
MAIN 3.3V DET	MAIN 3.3V	10 BLINKS
SUB 5V DET	SUB 5V	10 BLINKS
SUB 9V DET	SUB 9V	10 BLINKS
PA-TUNER SOS	PA & TUNER+30V	10 BLINKS
FAN SOS	FAN CIRCUIT	11BLINKS
SOUND	SOUND OUT CIRCUIT	12 BLINKS

No video, No OSD

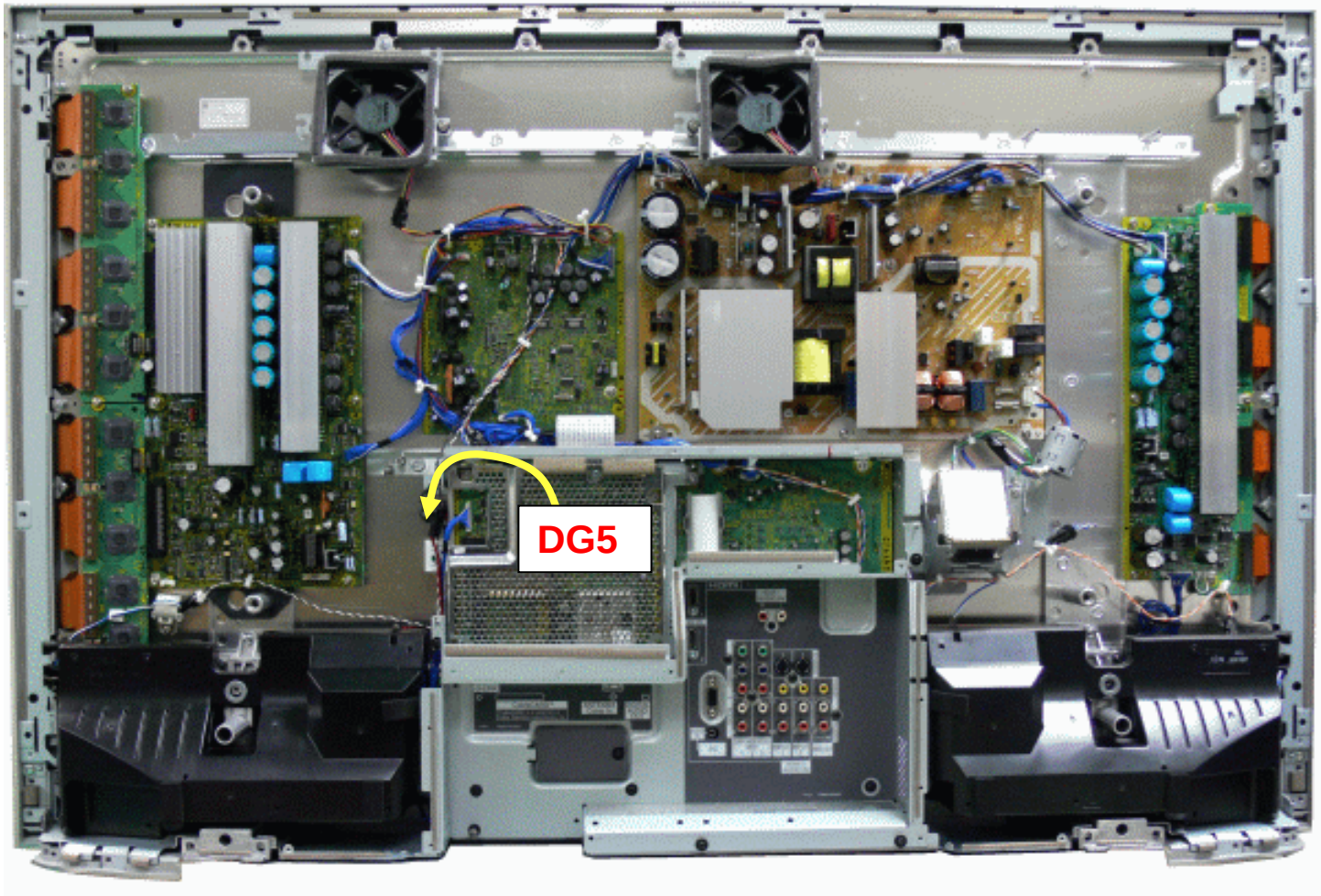
Determining whether a No video, No OSD symptom is caused by the video process or the panel drive circuit

1. Unplug the unit from the wall outlet.
2. Disconnect the connector DG5 from the DG board.
3. Plug the unit into the wall outlet and turn on the power.
4. If the unit displays a white screen, It is a video process problem.
5. If the unit does not display a white screen, Proceed to check the panel drive circuits.

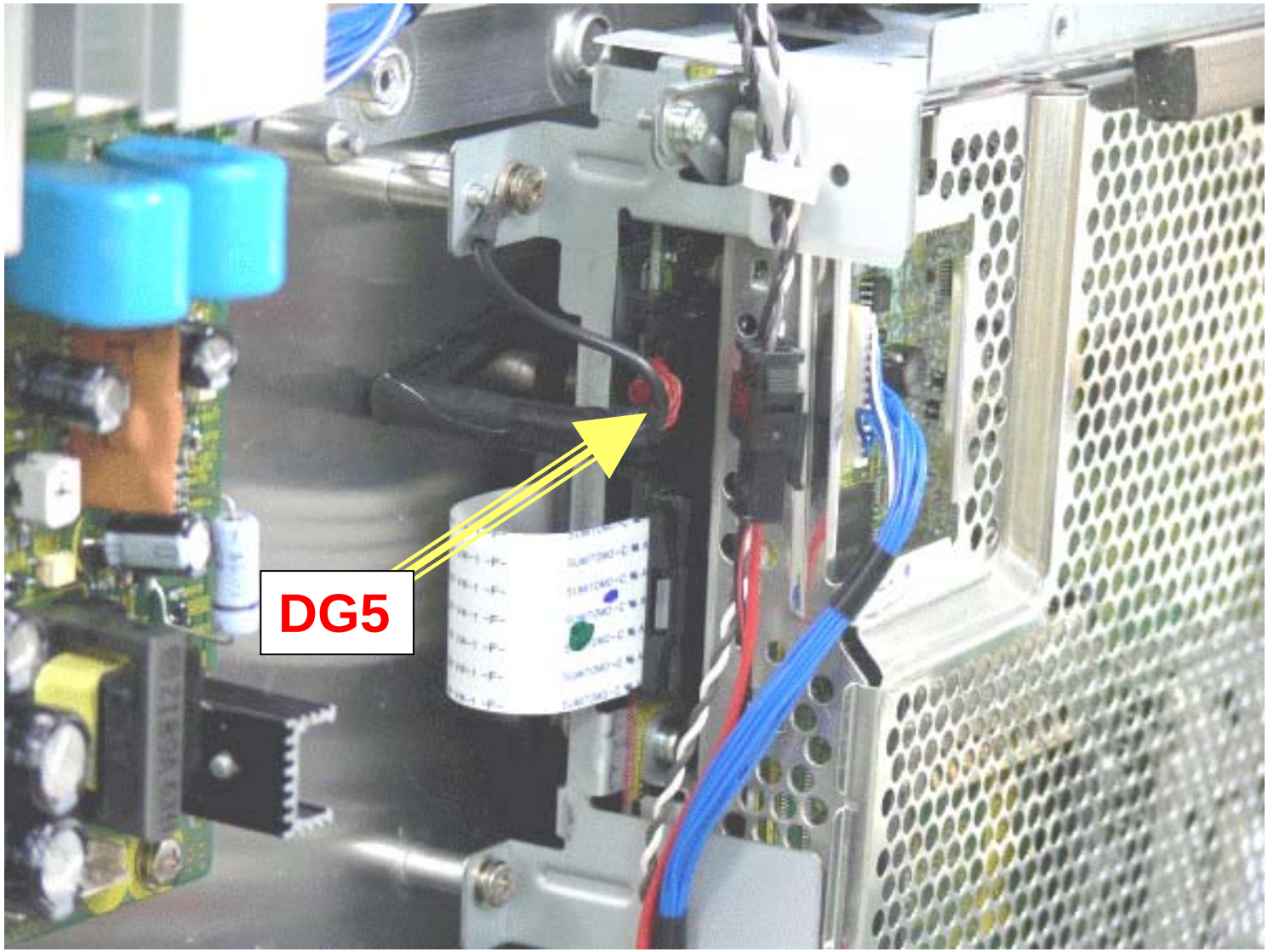
Electrical Location of Connector DG5



Physical Location of Connector DG5



Physical Location of Connector DG5 (Close-Up View)



Isolation of the SC and SS Boards

If any of the connectors providing the 15V or VSUS voltage to the SC or SS board is disconnected while the connectors that provide the Scan and Sustain Drive pulses from the D board are still connected, the TV will shut down.

Isolation of the SC and SS Boards

Precaution: **Do not let the TV run for more than 30 seconds while isolating any of the circuit boards.**

The Scan Board (SC) and the Sustain (SS) board could be easily isolated.

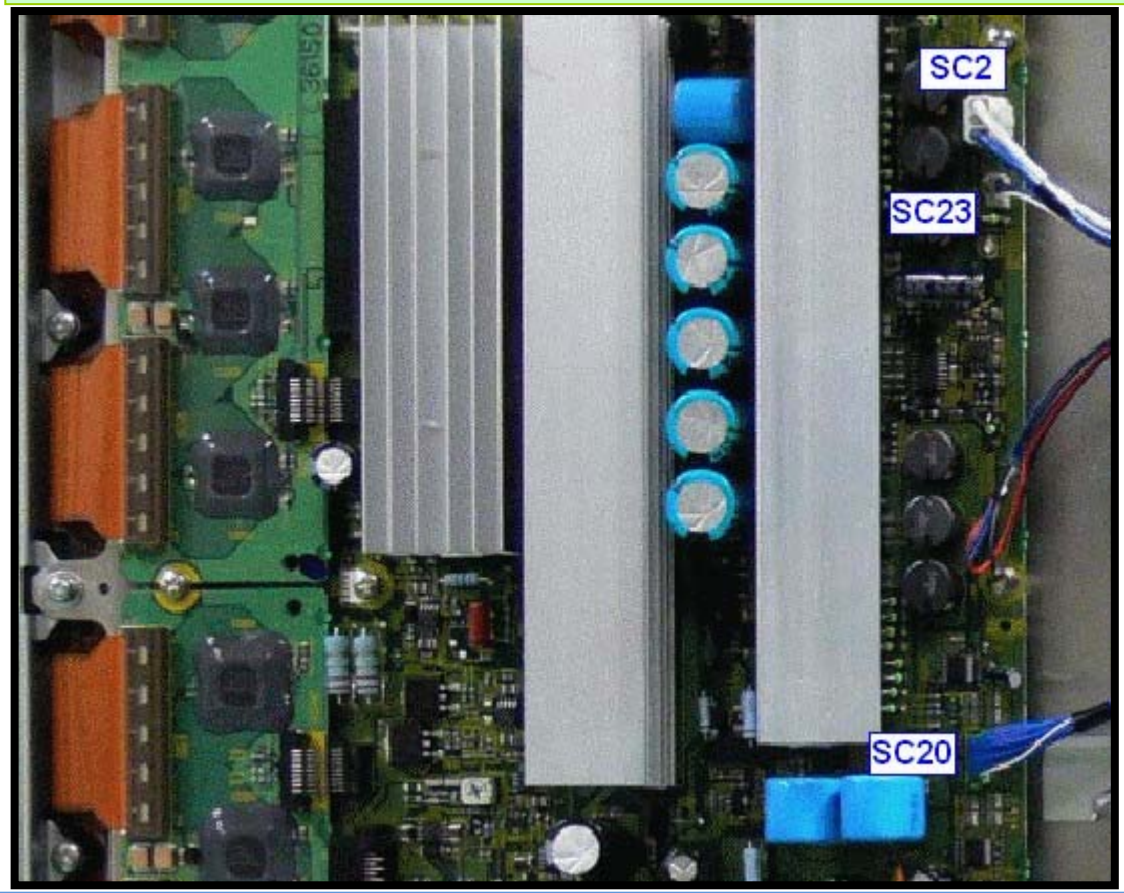
This can be useful to diagnose:

1. Shutdown Problems
2. Video Problems.

Isolation of the SC Board

Connector Location

The SC board could be isolated from the sources (Supplied Voltage & Scan Control Pulses)



Supplied Voltage = *VSUS* (Connector SC2) *15V* (Connector SC23)

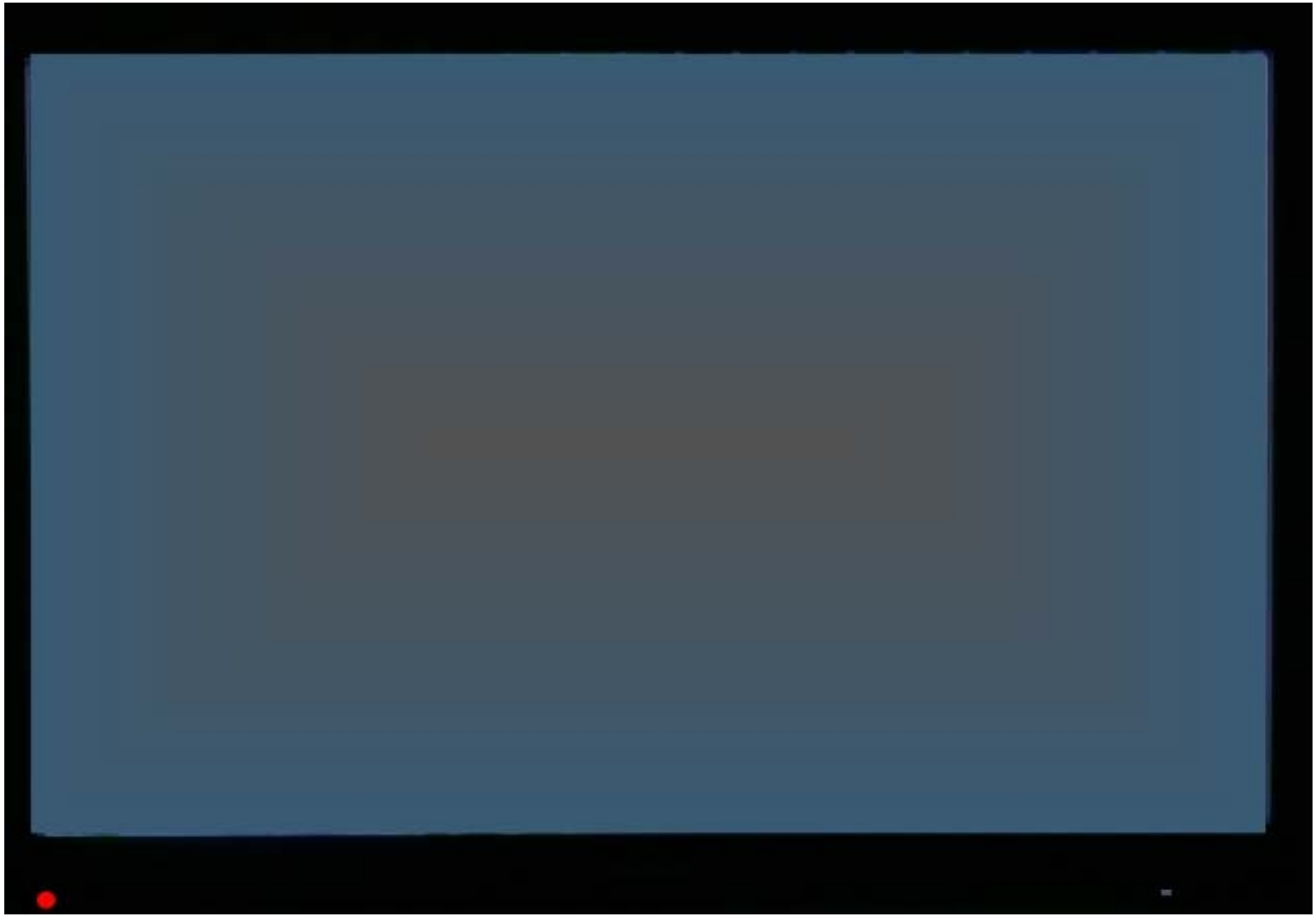
From Power Supply (P board)

Scan Control

Pulses = Connector SC20 from the SC board

SC2, SC23, and SC20 Disconnected

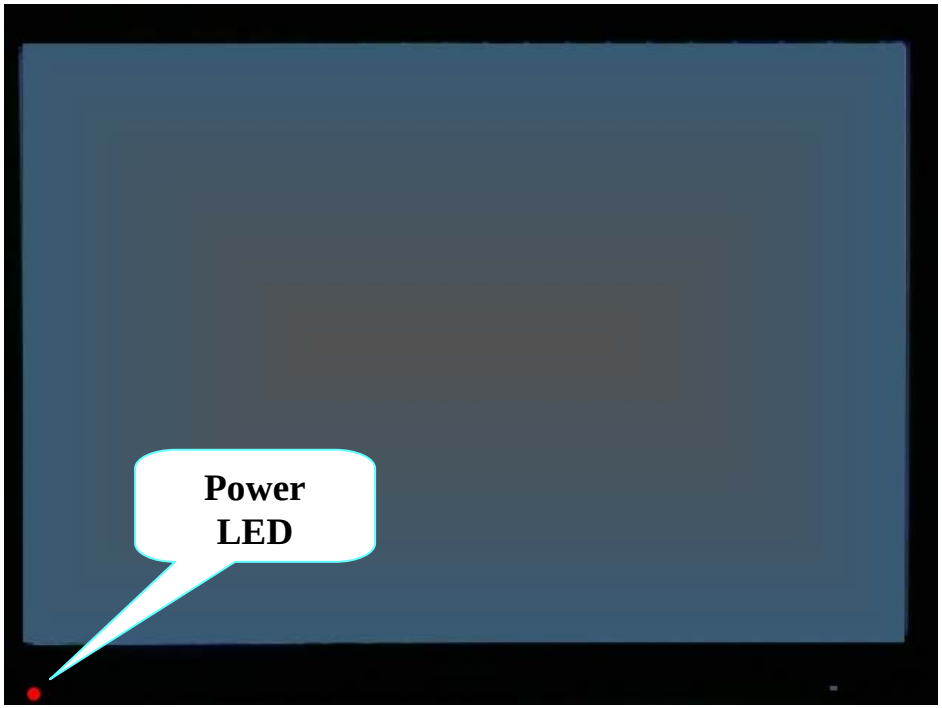
SC board completely isolated from the sources (P and D boards)



This is useful when the Power LED Blinks 6 or 7 times.

Expectation when Isolating the SC Board

The Supplied voltage VSUS and 15V (SC2 & SC23) cannot be disconnected while the Scan Control pulses (SC20) are being supplied to the SC board. This will cause a shutdown condition.



If only SC2 is disconnected while SC23 and SC20 are connected:

The Power LED blinks 6 Times

If only SC23 is disconnected while SC2 and SC20 are connected:

The Power LED blinks 7 Times

If both SC2 and SC23 are disconnected while SC20 is still connected:

The Power LED blinks 7 Times

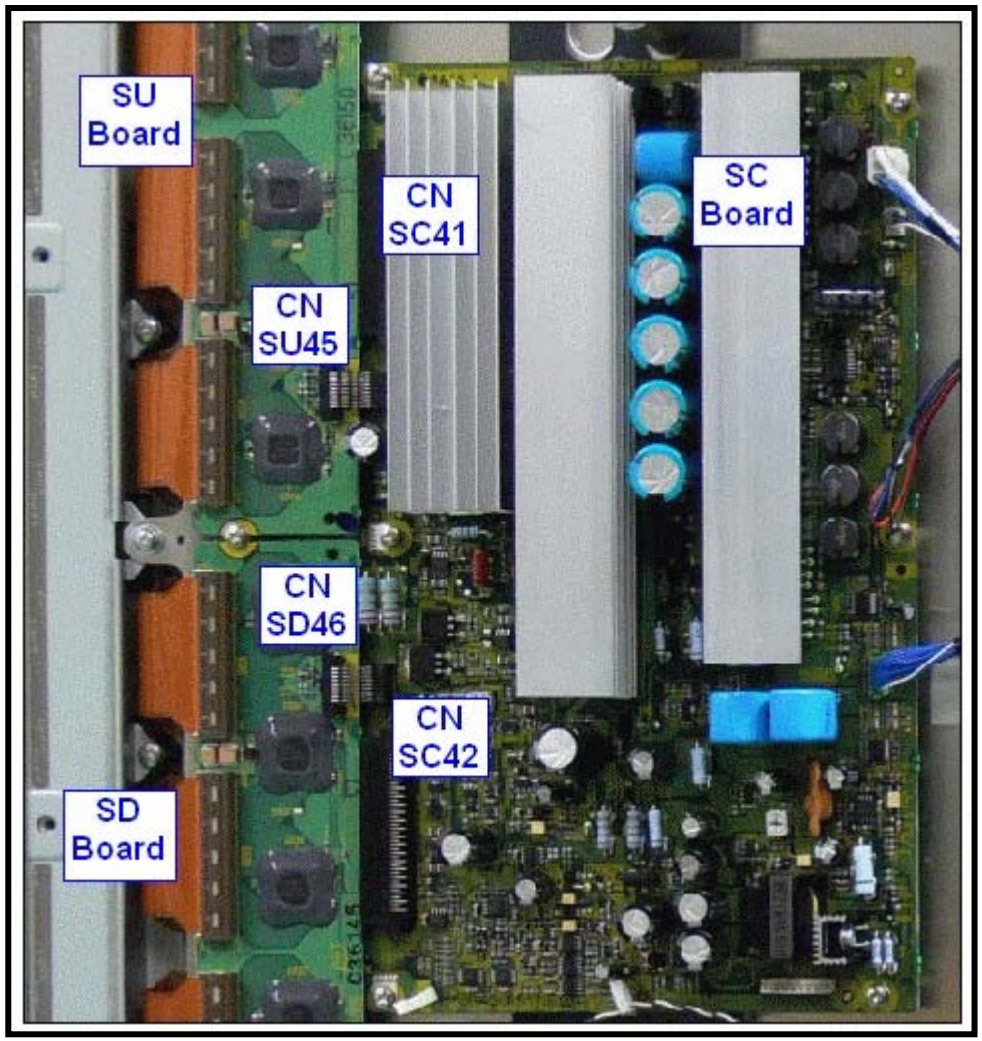
If SC20 is disconnected while SC2 and SC23 are still connected:

The Power turns ON (Black Picture – No OSD – Sound is OK, and there should be video out of the Monitor Jack))

SS LED is ON and SC LED is OFF

Isolation of the SC Board

The SC board could be isolated from the Driver Boards (SU &SD)



Sometimes the TV goes into "Shutdown" indicating that the problem is located on the SC board. This does not necessarily means that the SC board is the cause of the problem.

When this occurs, Disconnect both the SU and the SD boards from the SC board.

Note: To disconnect, remove 2 screws holding each of these boards in place and disconnect SC41, SU45, SD46 and SC42.

Isolation of the SC Board

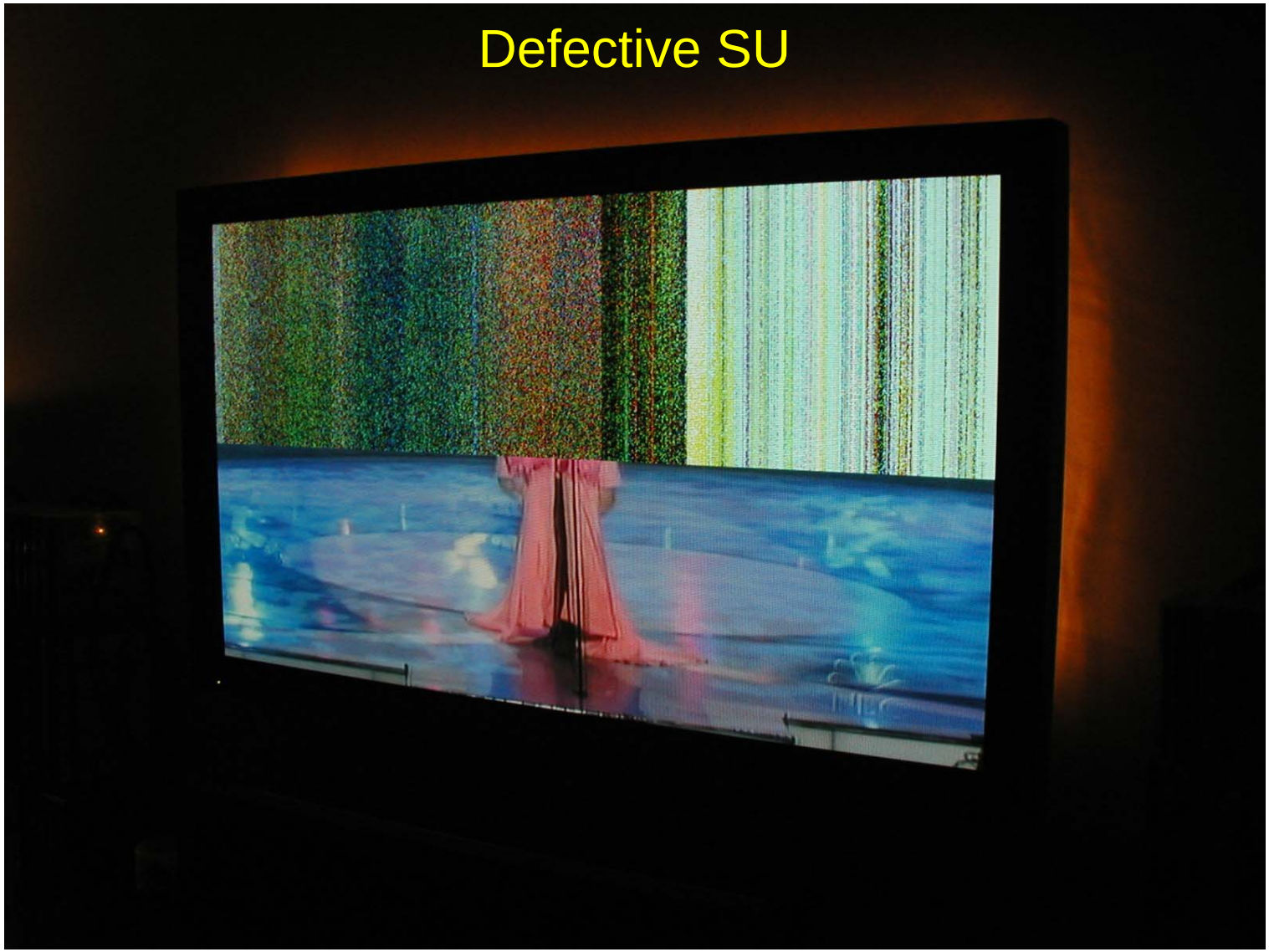
The SC board could be isolated from the Driver Boards (SU &SD)

Sometimes the TV may not go into “Shutdown” when there is a scan problem. This symptom seems to be caused by a defective D or SC board. When in reality, it is caused by the SU board.

Disconnecting the SU board yields a good picture at the bottom half of the screen and a completely black area in the upper half of the screen.

When this occurs, disconnect the SU board from the SC board.
Note: To disconnect, remove 2 screws holding the boards in place and disconnect SC41, SU45.

Isolation of the SU Board



Display Problem

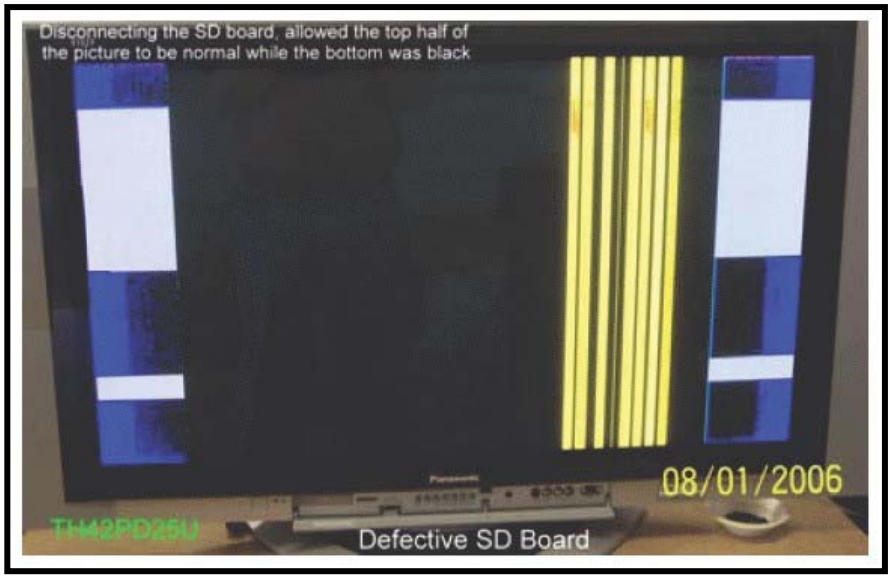
Please no wild guess _

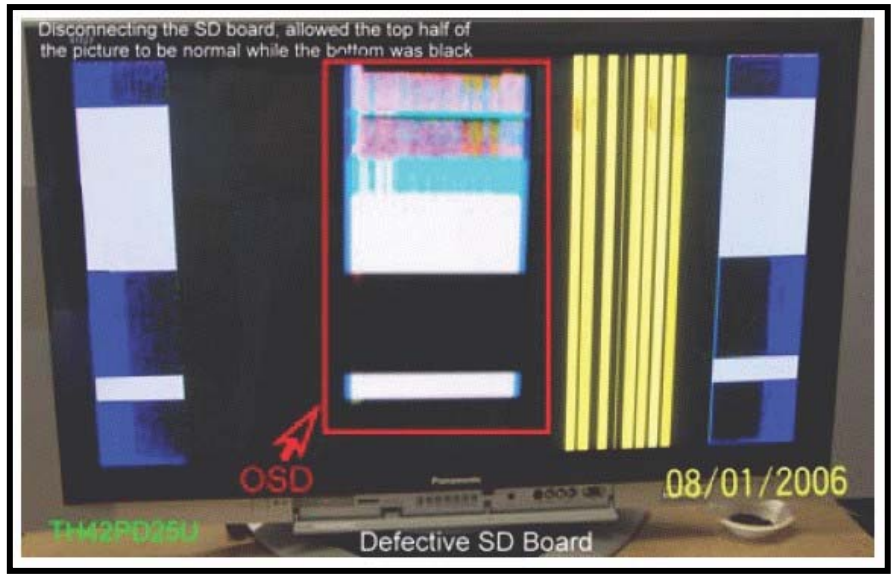
1. What is the cause of this symptom?
2. How do you isolate a problem of this kind?

Isolation of the SD Board

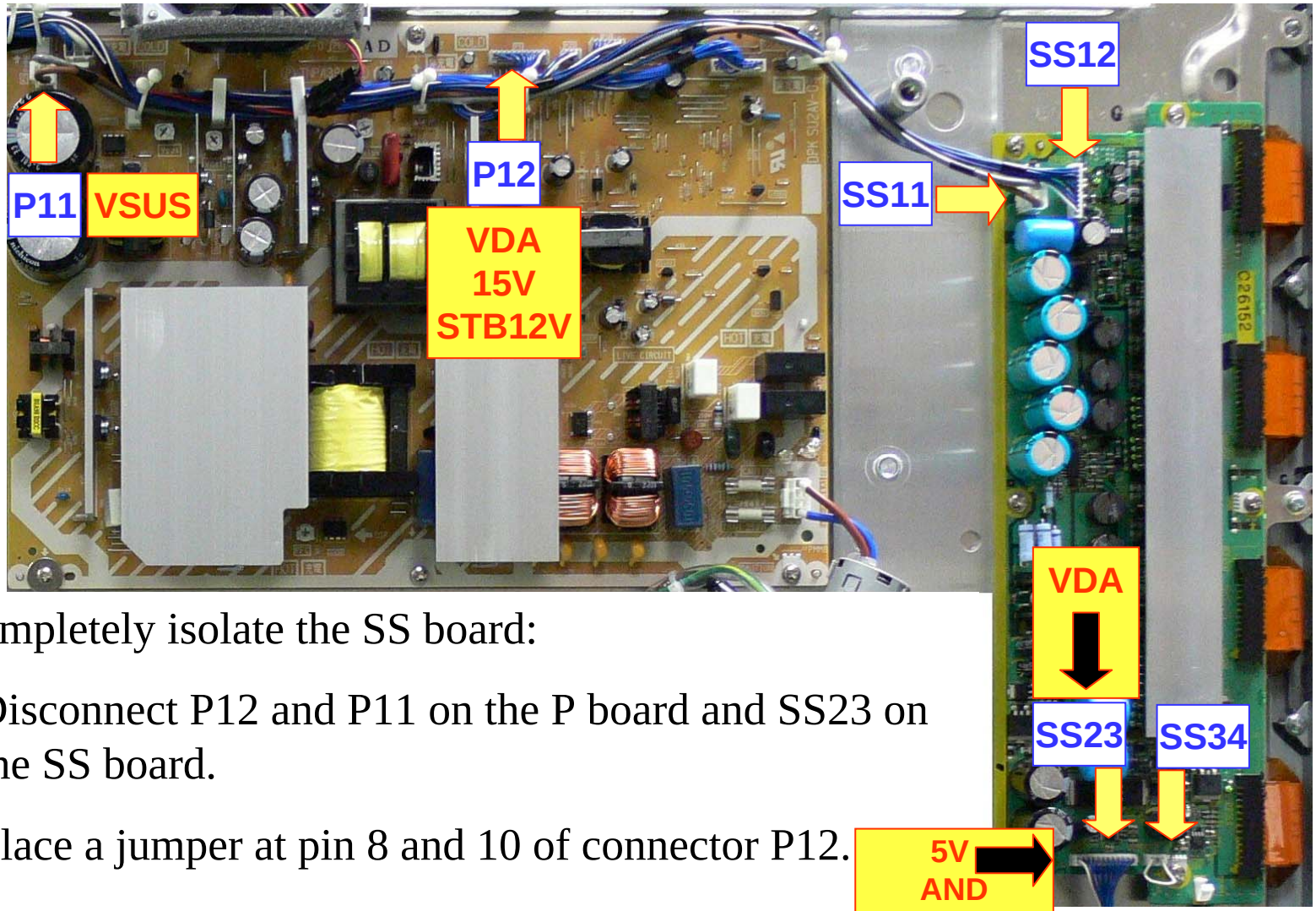
Please no wild guess _

1. What is the cause of this symptom?
2. How do you isolate a problem of this kind?





Supply Voltage from P to SS board

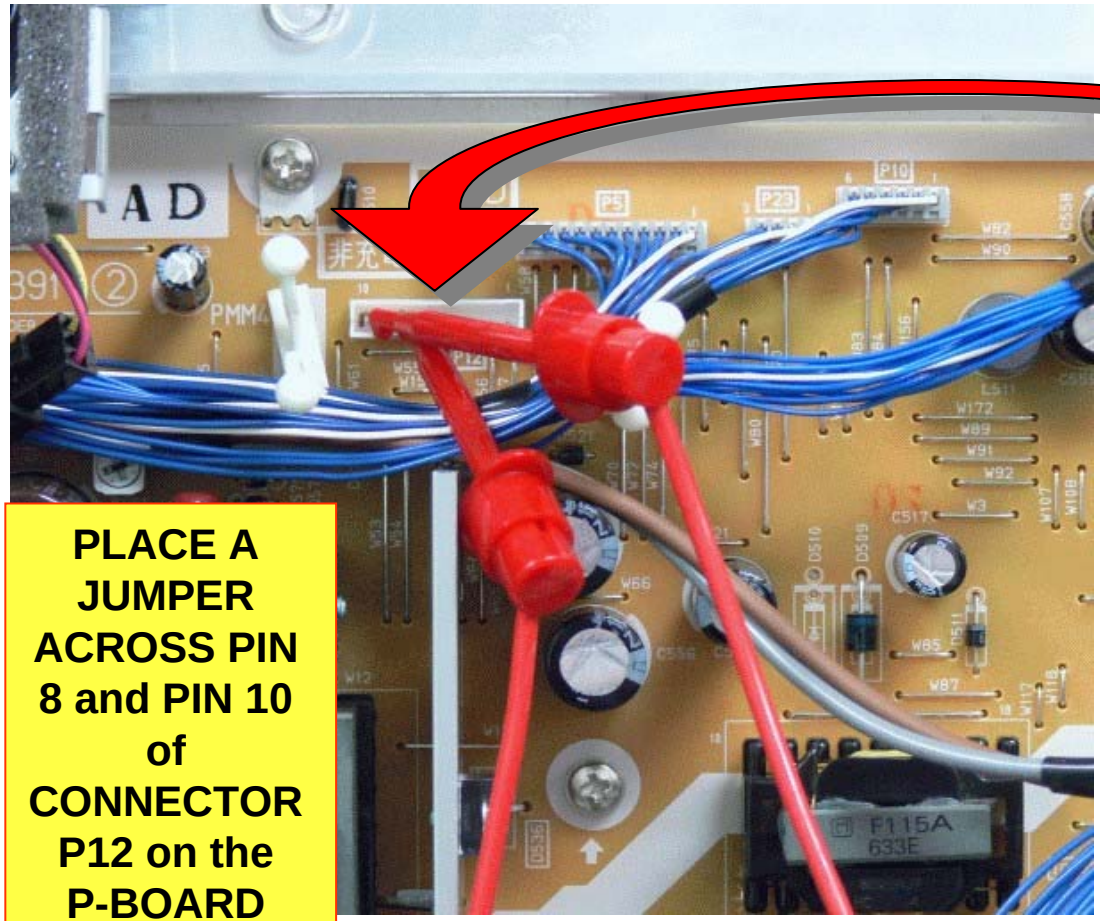


To completely isolate the SS board:

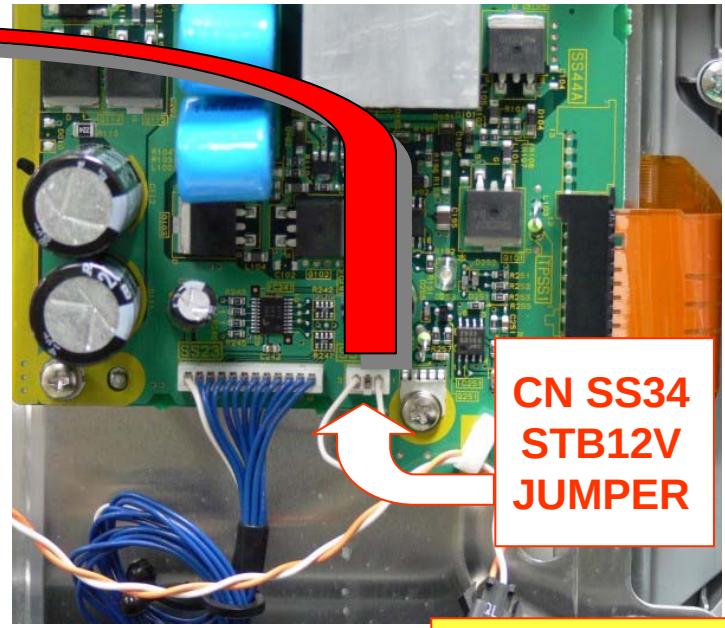
1. Disconnect P12 and P11 on the P board and SS23 on the SS board.
2. Place a jumper at pin 8 and 10 of connector P12.

The screen is black because there is no VDA voltage from P12 of SS23 provided to the C boards.

Supply Voltage from P to SS board



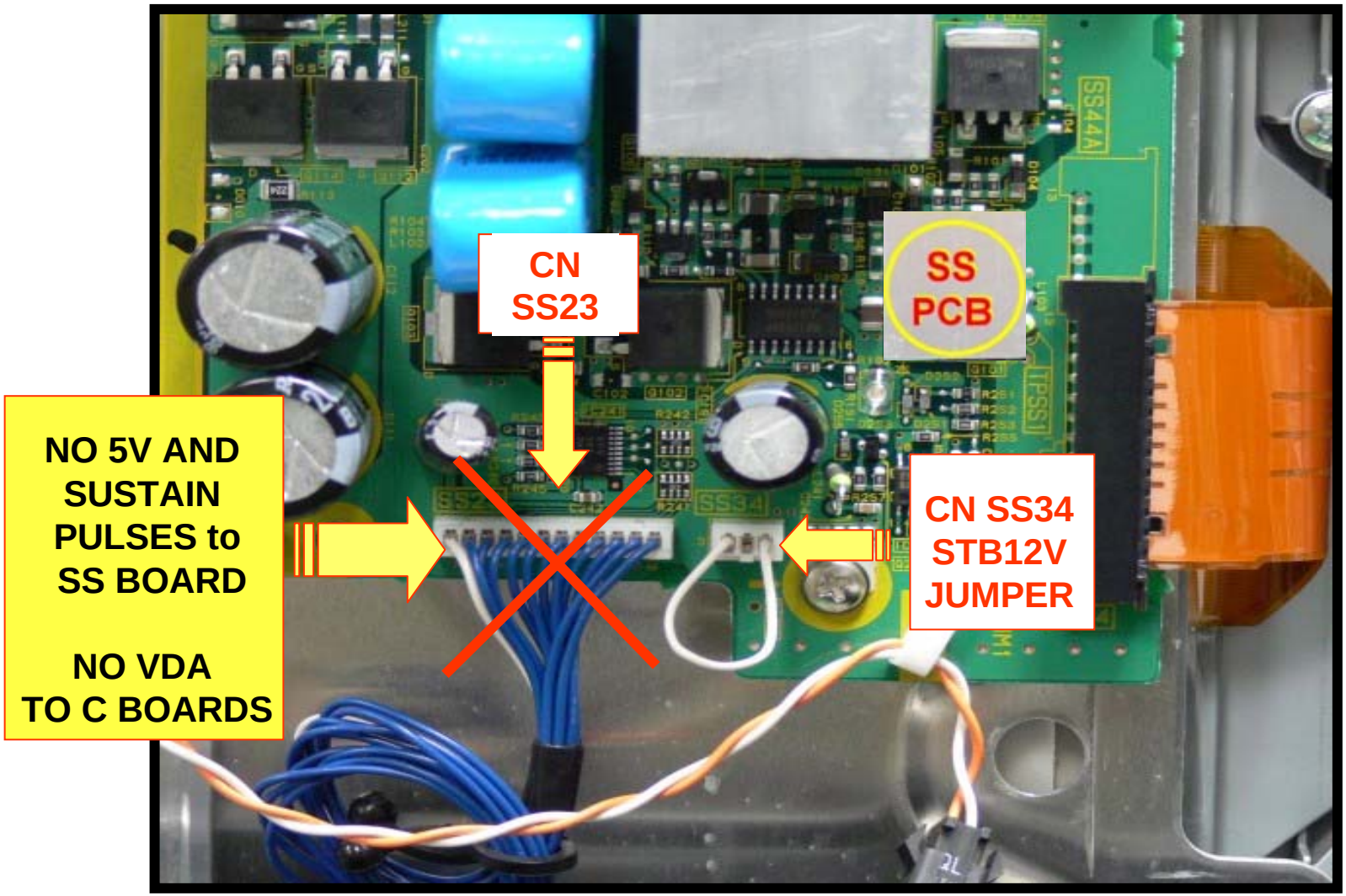
PLACE A JUMPER ACROSS PIN 8 and PIN 10 of CONNECTOR P12 on the P-BOARD



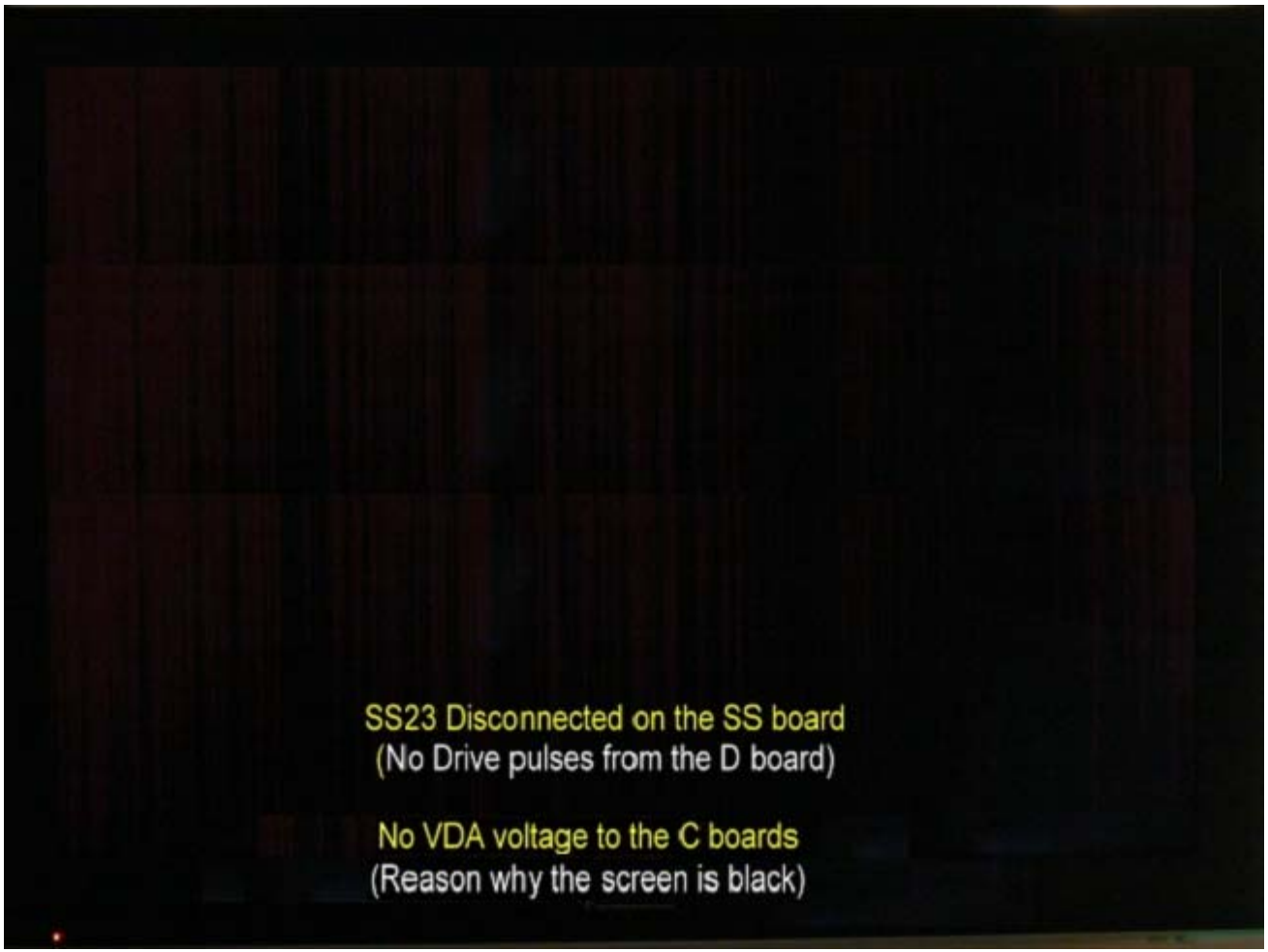
Or MOVE THE JUMPER FROM SS34 TO PIN 8 and PIN 10 of CONNECTOR P12

If P12 or SS12 is disconnected, pin 8 should be connected to pin 10.

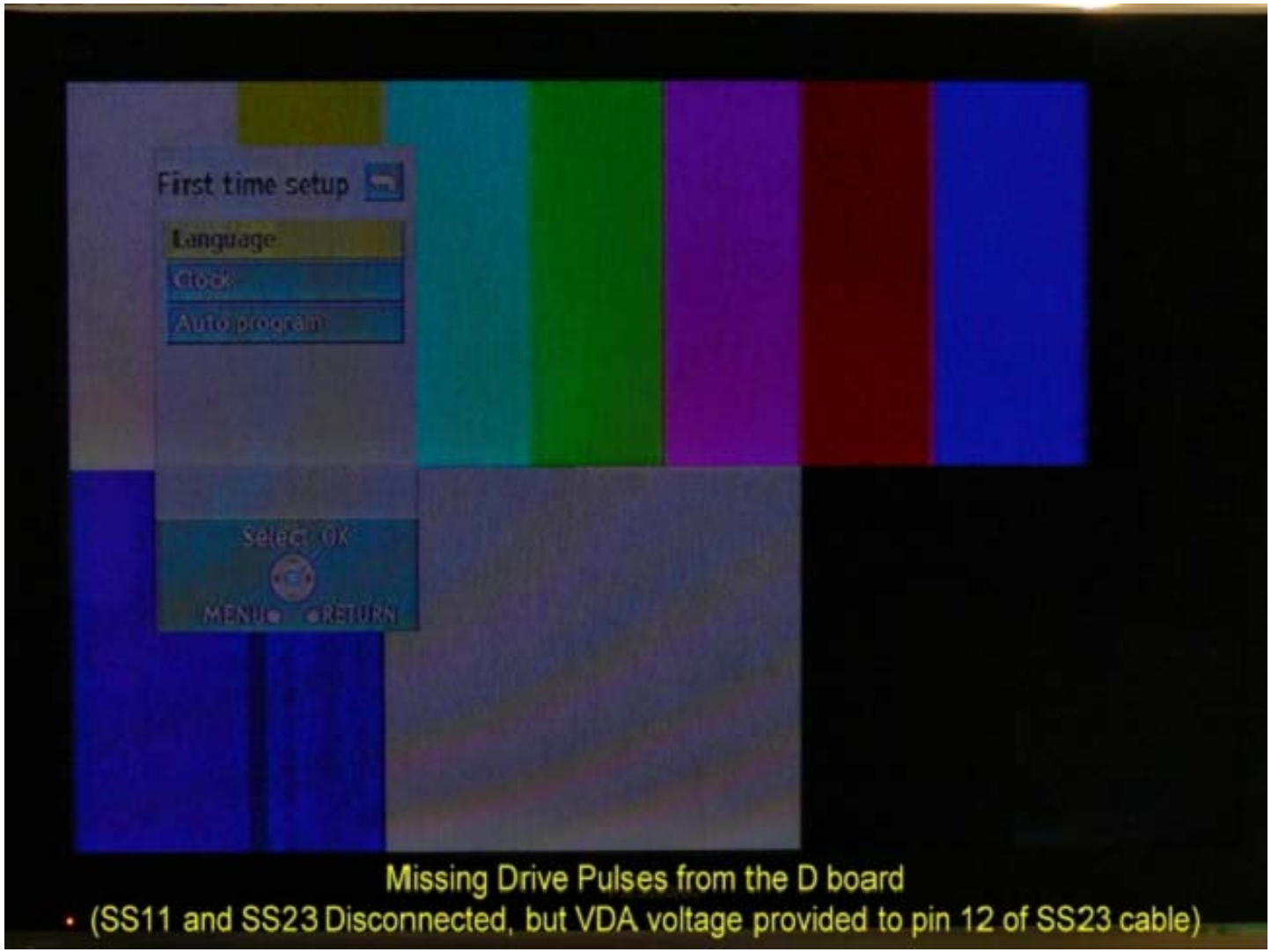
No output to SS board from the D board



No output to SS board from D board



No output to SS board from D board



Pin 1 from P12 provides the VDA voltage to SS board

Defective D board

Defective D board

Defective D board

SC Board

SC Board


Defective SC board
[1] TV
[2] Component 1
[3] Component 2
[4] CABLE
[5] HDMI 2
[6] DVD
[7] Video 2
[8] Video 3

Defective DG board

Thank you for your participation